Mentouri University-Constantine

Faculty of Letters and Languages

Department of Languages

The Role of Cohesive Markers in Reading Scientific Texts.

The Case of First Year Master Students of Physics,

University of Constantine.

Dissertation Submitted in Partial Fulfilment of the Requirements for the Master Degree in Applied Language Studies (English for Science and Technology).

Board of Examiners

President: Pr. Moumene Ahmed, M.C., University of Constantine.

Supervisor: Dr. Labed Nacif, M.C., University of Constantine.

Submitted by:

Miss Fatima Zohra MALKI

Supervised by:

Dr. Nacif LABED

2009 - 2010

Dedication

I dedicate this work to my loving Father and caring Mother, to my supportive sisters and encouraging brothers, to my sisters and brothers in law, especially Rabeh, and to my dearest nieces and sweetest nephews.

I would like also to dedicate this dissertation to all my family and my friends without exception.

Acknowledgments

First and foremost, I would like to express my sincere thanks and heartful gratitude to my supervisor Dr. Nacif LABED for his huge efforts, lasting assistance, supportive guidance, and continuous patience. He followed the progress of our dissertation so generously and step by step without any hesitation. It is really an honour for us to work under his supervision.

I am also grateful to Pr. Nourdine MEBARKI in the Department of Physics for his help and patience, and the Master students for their collaboration with us in the development of this dissertation.

I would like also to thank the board of examiners for the efforts and the time they spent in examining this work.

Last but not least, I owe a special debt of appreciation to my tender parents for everything, as well as my family for their caring.

Abstract

This present study is conducted to point out the role of textual cohesion in improving the reading comprehension level of Master students of physics at the University of Constantine. Our work is an attempt to diagnose the problematic areas that led to the reading comprehension difficulties. So, we have tried to identify the causes behind their appearance in the first place, where we have actually found that these problems are due to the students' lack of proficiency in both General English and English for Science and Technology that is why they have the poor level in English. In fact, we thought that the connecting devices represent one critical cause of comprehension problems for science learners who study in a foreign language. In the light of this, we have hypothesised that if the students of physics understand textual cohesion, they will comprehend better when they read physics texts in English. To test out this hypothesis, we conducted an experiment in which we used two research tools, a questionnaire and a test. The analysis of the findings together with the literature review in Chapters One and Two provided us with a clear picture about the students' reading level and how the lack of linguistic knowledge, ignoring the English cohesive ties, is one major obstacle for comprehension. At the end, we have come up with the conclusion that we have to remedy the inadequate English course design and to make it fit more the needs of students in learning General English and English for Science and Technology.

List of Abbreviations

B.A.	Bachelor of Arts.
EAP	English for Academic Purposes.
EOP	English for Occupational Purposes.
ESP	English for Specific Purposes.
EST	English for Science and Technology.
F.L	Foreign Language.
GE	General English.
M.A.	Master of Arts.
N.N.S	Non-Native Speakers.
Ns	Number of Students.
TALO	Text as a Linguistic Object.
TAVI	Text as a Vehicle for Information.

List of Tables

List of Figures

Table of Contents

General Introduction

Chapter One: English for Science & Technology and Scientific Texts

Chapter Two: Reading Comprehension and Textual Cohesion

Chapter Three: Fieldwork

General Introduction

General Introduction

Introduction

Learning a foreign language is a task that needs devotion, concentration, motivation, and time, and so it is with learning science. Indeed, students who study science in a foreign language find themselves facing the problem of understanding both the scientific content and the foreign language of presentation.

1. Rationale

In the department of physics, University of Constantine, the decision makers emphasize the importance of English to students of physics, of our interest in the present study, in that these students need to be able to collect information pertaining to their subject matter in English books, magazines, journals, etc. However, the problem physics students encounter when reading scientific articles in English is their inability to understand what they read. As a matter of fact, when asked, they informed us that they learn General English but not English for Science and Technology. For that matter, we see that the EST courses need to be reconsidered to respond to students' needs in English for science and technology.

In fact, reading and comprehending texts in the mother tongue is different from that in a foreign language because in the native language, most readers are able to predict and infer what will come next. To explain this situation, Suad Belfakeh (2009) suggests some reasonable explanation to the problem that she found secondary school students in Yemen have. She says that in order to comprehend a written text as efficiently as possible, we should first know the code and the combinations of items that are likely to occur most. Second, we should have some background knowledge about the topic. Finally and most importantly, we should be well acquainted with the lexical, syntactic and rhetorical devices that can **guide** us

during the reading process. This means that for foreign language learners and particularly for the students of our interest, the way to learning does not seem easy.

2. Statement of the Problem

Most students of physics are unable to read in English because they have problems with the understanding of intra and inter sentential connectors, but not because they have problems with the understanding of scientific and technical vocabulary. Therefore, the research problem lies on the failure of the learners in comprehending physics texts due to deficiency in identifying cohesive ties for linking sentences.

3. Research Questions and Hypothesis

In the light of this problem, we put the following research questions:

- Are students of physics aware of the importance of cohesive ties to comprehend physics texts?
- Is this situation an outcome of poor English for Science and Technology teaching?
- Is a General English course necessary before giving an English for Science and Technology course?

Around the above research questions, we hypothesise the following:

If first year Master students of physics at the University of Constantine understand textual cohesion, they will comprehend better when they read physics texts in English.

4. Aim of the Study

We set as a main concern of this present study to point out the role of textual cohesion in improving the reading comprehension level of Master students of physics at the University of Constantine while reading physics texts in English. Identifying textual cohesion in scientific texts is one way in which we can enhance the reading comprehension to science

students. So, showing how cohesion can contribute to their comprehension of scientific texts/discourses is very beneficial to ameliorate their level in reading scientific literature. In other words, to improve their ability to comprehend scientific texts in English, students of physics should first be able to identify textual cohesion in order to understand its function to the overall meaning of the text.

5. Review of the Literature

Current researches on comprehension during reading of scientific texts have shown that there are many factors that may influence the comprehension of information in scientific texts. *Prior domain knowledge*, *individual reading skill*, *text structure*, and *textual cohesion* are just few factors (Kendeou, & Van Broek, 2007; Ozuru, Dempsey, & McNamara, 2009).

In the present study, we will focus only on one factor, which is textual cohesion. Recent studies on cohesion in the reading comprehension processes support the idea that readers are aided by surface textual connectors. They have emphasized the importance of cohesion in text comprehension (Lightman, McCarthy, & McNamara, 2007). As a matter of fact, cohesion has the property of making what is implicit between the lines in a text explicit to the reader, i.e., easy to understood. For this reason, we are interested in investigating its usefulness to students of physics.

6. Methodology of Research

6.1. Materials and Procedure

To have a general idea about the students' performance in English, we will use a questionnaire that will be addressed to them. The questionnaire will be designed to elicit information about the students' attitude towards English and about their reading situation in

which they are supposed to use cohesion as a means to solve their comprehension problems that are due to deficiency in English.

In order to check the students' level of comprehension, we will administer them three physics texts to read, ranking from low, average, and high in cohesion. These texts are followed by comprehension questions to assess their comprehension level. The texts are taken from university level physics textbooks. This test aims to prove that high-cohesion in texts facilitates the comprehension of scientific texts for Foreign Language science learners.

6.2. Subjects

In the department of physics, there are three groups of first year Master students of respectively eight, fourteen, and twenty-three students, which make a total of forty-five students who will represent our research population. Each group represents a specific option in physics.

We have decided to work with these students for the following reasons:

- They have already studied EST (English for Science and Technology) for two years: at the third year B.A. and first year M.A..
- They are supposed to be sufficiently proficient at least in General English to understand a simple scientific text and to recognize its organization.
- These students are not tabula rasa; they have certain background knowledge about English and know the elements of the language such as basic grammatical rules and vocabulary.

For sampling, we have chosen randomly twenty students. This randomisation was based on selecting the students from the option *Physique des particule élementaires* as their number exceeds twenty, and they are the only group who studies physics theoretically.

6.3. The Structure of the Study

The present research is divided into three chapters. The first two chapters are devoted to the theoretical part, and the third chapter is consecrated to the fieldwork.

Chapter One will tackle some theoretical issues about ESP and the emergence of EST when the focus was shifted from special languages of specialisms to specific purposes in learning English. In addition to that, we will discuss the discourse approaches to analyze scientific discourse in order to see their usefulness to Non-Native Speakers science learners in decoding scientific texts. The chapter will also discuss some basic features of texts in science in particular. At the end, we will highlight some comprehension problems science students generally face in reading Foreign Language texts/discourses.

Chapter Two will shed light on the relationship between textual cohesion and the reading process. Focusing on reading comprehension, some reading strategies are discussed to introduce how to read for the purpose of comprehending and not for merely answering questions. We will then give a detailed description of textual cohesion and its positive effects in guiding readers to comprehend a text as effectively as possible.

Chapter Three will deal with data analysis. It will contain a detailed analysis of the students' questionnaire in addition to interpreting the results of the test.

Conclusion

In short, this study tries to suggest a solution to one critical problem that students of science have with English. The aim is to improve science learners' comprehension through the use of textual cohesion as a clue or guidance to how the students could read scientific texts efficiently.

The study also aims at reconsidering the students' needs as a priority when designing courses. This is expected to help them gain effective, useful, and sufficient background in the realm of their studies.

Chapter One: English for Science & Technology and Scientific Texts

Chapter One: English for Science & Technology and Scientific Texts

Introduction

Throughout history, English has developed till it has reached the present-day position as a language for international communication and, especially a language of science and technology. In effect, the reality that English "has gained ascendancy in international science, technology, and trade" (Johns & Duddley, 1991, p.297) gives it a privilege to be learned by people everywhere to be in touch with the world. The focus on teaching or learning English for the sake of research or for studying has led to the adoption of various approaches to teach/learn English. In this chapter, we will discuss the emergence of one of these approaches which is concerned with teaching English as a foreign language and for specific needs.

1.1. English for Science and Technology: An Overview

Over the past few years, there has been a rebellion against the traditional English teaching practices where "all the learners were served up with literature regardless of their aims, needs, or interests" (McDonough, 1984, p. 4). The dissatisfaction of learners and teachers has led to the birth of a new approach to language teaching in which the course design is primarily based on the learners' specific needs, i.e., learning a specialized variety of English appropriate to their specific fields.

The serious revolutionary shift towards investigating the linguistic features of scientific language varieties gave birth to notions like 'register', 'special language', and 'restricted repertoire' that describe specialist, scientific, and technical vocabulary related to different disciplines. Thus, the emergence of English for Specific Purposes (ESP) was just a natural extension and a realization of this new trend in teaching English for identifiable purposes and specifiable needs.

ESP has rapidly expanded throughout the world as a new means to serve particular needs. The two features 'international in scope, specific in purpose' become parts of its essence that describe precisely and concisely its very nature (Johns & Duddley, 1991).

1.1.1. English from 'Special' to 'Specific'

Mackay and Mountford (1978) suggest that language learners generally require English as a means for either furthering their specialist education or for performing a social working role. In this respect, they argue that "ESP is generally used to refer to the teaching of English for a clearly utilitarian purpose. This purpose is usually defined with reference to some academic and occupational requirements" (p.2). The utilitarian purpose is in fact what the learner wants exactly from learning English. Consequently, recognizing learners' utilitarian purpose becomes the guiding principle in ESP. That is why Hutchinson and Waters (1987) comment on this by saying: "tell me what you need English for and I will tell you the English that you need" (p.8).

The shift toward narrowing down 'register' to 'sub-registers' was derived from the reality that students at the tertiary level need no more to study English as a general course, but rather would desire to deepen their English language knowledge to suit their particular needs. The growing awareness of learners that they no longer learn the language for its own sake provided the basis for a new vision towards learners' needs by ESP practitioners, that is to consider English as a means to an end and not an end in itself. This comes from the reality that English can be learnt as either a 'subject' or a 'service'. McDonough (1984) describes the former as learning English for its own sake; while the latter is concerned with learning English to serve particular utilitarian purposes defined by learners' needs in certain circumstances. According to him identifying these purposes is the heart of teaching ESP.

In fact, what an ESP learner needs is a given repertoire, which is directly linked to his specialist field of study, but not a whole language. In this context, the meaning of the word 'special' was generally attached with the phrase 'special language' which means a 'restricted repertoire', as Mackay and Mountford (1978, p.4) put it,

> the only practical way in which we can understand the notion of special language is a restricted repertoire of words and expressions selected from the whole language because that restricted repertoire covers every requirement within a well-defined context, task, or vocation.

As a matter of fact, this restricted repertoire is an outcome of a primitive selection and reduction of language items to isolate languages of specialisms suitable to learners' needs.

The confusion, however, arises not with the word 'special' alone, but over the two notions of 'special language' and 'specialized aim'. The two notions apparently seem relevant, but in fact they are entirely different notions. While the first one refers to the above-mentioned 'restricted repertoire', the other one has to do with the 'specific purpose' for which learners learn a language, not the nature of the language they learn (Mackay & Mountford, 1978).

The meaning of the word 'special' in ESP has nothing to do with restricted language or the specific jargon learners learn but rather ought to be on the purpose for which they actually learn English. This view has been summed up by Mackay & Mountford (1978) as follows: "the emphasis of the word 'special' then, in English for special purposes should be firmly placed upon the purpose of the learner learning the language, not on the language he is learning" (pp.5-6). That is why the word 'specific' in 'English for Specific Purposes' emphasizes straightforwardly the learner's purpose from learning English.

1.1.2. The Emergence of EST

The numerous specific purposes of learners have led to the realization of different varieties of ESP. The most common categorization of ESP is expressed in three major areas: English for Academic Purposes (EAP), English for Occupational Purposes (EOP), and English for Science and Technology (EST). According to Kennedy & Bolitho (1984), in the first branch, ESP is taught within educational settings where students need English for their studies. More specifically, learning EAP "demands not only knowledge of English lexicon and grammar in general, but also the knowledge of subject specific content and the linguistic conventions of the specific field of study" (Kurodo, 2003, p.20). In the second branch, ESP is related to the teaching of English to students who need it for occupational requirements such as communicating with work-staff or reading work-related journals, manuals, and pamphlets (Kennedy & Bolitho, 1984). The last branch of ESP is EST, which is directly linked with scientific English, as its name suggests, it reveals a greater emphasis on the language of science and technology than the other types.

Kennedy & Bolitho (1984, p.6) again state that

> much of the demands for ESP have come from scientists and technologists who need to learn English for a number of purposes connected with their specialisms. It is natural, therefore, that English for science and technology should be an important aspect of ESP proposed by Strevens (1977).

It is important, henceforth, to note that EST has played a 'driving force' for theoretical innovation in ESP for a long time.

Recently, EST has gained a great interest from researchers as the world witnesses a huge movement of development in science and technology. To cope with this, students of science need a language that gives them access to the best databases available in scientific

literature. EST is that variety of ESP, which guarantees best this accessibility. Jones and Roe (1975) in their seminal paper "Designing English for Science and Technology" (as cited in Ramakanta, 2009) make it clear that the central concern of EST is the accessibility of knowledge. They claim that "we thus need a rhetoric that reveals how knowledge is mapped into the print and sound system of English" (¶ 2).

Subsequently, the EST curriculum should enable learners of science to:

- Obtain information by reading and understanding different text types in science and technology in English.
- Present information pertaining to science and technology at an appropriate level in written or spoken English.
- Think critically and give points of view on issues belonging to science and technology.

Following this, we can say that EST covers a large area from general sciences such as physics, chemistry, biology, mathematics and environmental education to various technologies.

1.1.3. Discourse Analysis of the Scientific Text

In its brief history, EST has adopted various approaches to text analysis, from the early register analysis, to rhetorical analysis associated with Trimble (1985), through the functional/ notional approach associated with the textbooks, to the dominant approach of today, genre analysis. Each approach is concerned with the analysis of a particular characteristic of EST texts that is thought to be useful to non-native learners in acquiring knowledge about the nature of EST texts.

Teaching scientific English to N.N.S raises some critical questions about the specific demands required to deal with the conventional rhetoric of science. The early attempts to teach scientific English focused solely on the identification and selection of lexical and grammatical items, which proved to be ineffective to F.L science learners. The various approaches to discourse analysis come to existence as a remedy to this situation. They provide learners with a

framework where learners can identify and analyze the inter and intra components of texts as they are presented by natives. This discourse knowledge helps learners to understand the conventional organization and presentation of a particular discourse in a comprehensible and patterned way; and subsequently, guides them to read as efficiently as possible scientific English.

Weise (1979), for instance, distinguishes two main approaches to discourse analysis: transphrastic (or phrase-linking) approach and communication-oriented approach. The central concern of the former is analyzing the interlinking semantic elements within texts (thematic-semantic coherence) whereas the latter is based on the communicative functional role of a text. Widdowson (1974) also identifies three approaches to the analysis of scientific discourse: text approach, textualization approach, and discoursal approach. From these approaches, the second one seems to be the most helpful for reading comprehension because it is concerned with analyzing the relationship between linguistic forms and their rhetorical functions within discourse. Another prominent discourse-based approach for analyzing scientific discourse is presented by Trimble (1985). His rhetorical approach highlights the importance of teaching explicitly the rhetorical organization of texts to non-native students to make reading comprehension more effective for them. We will discuss this approach in details in the following section.

In a few words, discourse analysis approaches provide materials developers with practical and useful information regarding textual characteristics of each field, and hence they can build materials that have a rhetorical basis. Besides, knowing the features of discourse provides teachers with systematic knowledge of the ways of describing texts; and as a result, they can make their students aware of the features of specific discourses. This discourse-based knowledge will not only influence the students understanding but also their speed of perception (Yorkey, 1970; Wright, 1987). That is, once the student is equipped with the knowledge of how

writers construct their writings in science, they can easily locate the information they need as quickly as possible.

1.1.4. EST Rhetorical Approach for Analysing Scientific Discourse

In scientific English discourse, certain rhetorical characteristics are more observable than others. Trimble (1985) claimed that these characteristics are the silent elements, which make the scientific discourse different from other forms of written English discourse. He tried to identify them and used the results obtained from his study to develop classroom materials. These materials were taught to non-native students in science or technical fields aiming at teaching science learners reading, and secondarily, writing in scientific English. His approach is called 'the rhetorical approach' in which the scientific text is analyzed in terms of three rhetorical concepts:

- The nature of EST paragraph.
- The rhetorical functions most commonly used in written EST discourse.
- The rhetorical techniques most commonly used in written EST discourse.

According to Trimble (1985), the key element in teaching EST discourse is the notion of paragraph. He selected it as the basic discourse unit for the analysis of EST discourse because he considered the paragraph as an appropriate container of information where we can see various pieces of information related in a patterned way. Following this, he defined EST paragraph as:

> a unit of written English discourse that presents the reader with a selected amount of information on a given area of a subject. This information is so organized by the writer that the rhetorical concepts chosen and the relationships between these concepts are the most fundamental for both the rhetorical purpose of the paragraph and for the level of the reader; that is, the reader's position in respect to the subject matter under discussion-beginner, expert, etc. (pp.14-15)

If the paragraph is such a key, then the rhetorical functions are the basis of his approach since Trimble (1985) believes that any scientific discourse is found to fulfill a certain function. For him, each rhetorical function provides readers with different kinds and with different amounts of information. For this reason, he defined them as "a name for what a given unit of the discourse is trying to do" (Trimble, 1985, p.12). He focuses on five rhetorical functions that he considered the most frequent ones in written EST discourse, which are description, definition, classification, instruction, and visual-verbal relationship.

The last concept in his approach, which is as important as the two previous ones, is 'rhetorical techniques' or, in a more operational terms for our present study, 'cohesive ties'. Rhetorical techniques are those elements that bind together the information in a piece of discourse. Using Trimble's terms, they are defined as "a name either for the frame into which writers fit their information or for the way in which the items of information chosen relate to one another or to the main subject of the given unit of discourse" (Trimble, 1985, p.12). Depending on the nature of relationships between the linguistic units, Trimble made the distinction between two types of techniques; those that are imposed by the nature of the material and include space order, time order, and cause/effect are called 'natural order'. In contrast, 'Logical order' is those techniques that are imposed by the writer's choice and include order of importance, comparison/contrast, exemplification, and analogy. Each technique whether natural or logical is chosen as a vehicle for making information explicit and clear for the reader. When the reader is able to identify and analyze the relationships that exist between the pieces of information and between the units that make up the total discourse, he will then be able to determine the rhetorical functions, which writers have chosen to present their major items of information.

In short, Trimble's investigation into the organization of information in science and technology discourse pointed out to the idea that some rhetorical structures are conventionally

more prominent in these types of texts than in others. In an operational way, he presented the above-mentioned concepts where each concept is "capable of being isolated and studied separately" (Trimble, 1985, p.69). Moreover, this thorough analysis comes from his belief that teaching these elements explicitly to non-native students in technical field is very useful in promoting their reading abilities.

1.2. Scientific Texts

1.2.1. The Text as a Vehicle for Information

Johns and Davies (1983) classify reading texts into two distinct types: TALO (Text as a Linguistic Object) and TAVI (Text as a Vehicle for Information). TALO refers to texts that have been written as illustrational models for syntactic structures, functions/notions, and lexis. TAVI, on the other hand, refers to those unmodified texts that aim to transmit information from writers to readers, especially in regard to learners' subject matter.

In the context of this present study, the text is looked upon as a vehicle for information and not as a linguistic object. For learners, a text is regarded as a means for obtaining information relevant to their fields of study where they can enrich their background knowledge.

1.2.2. The Scientific Text

Any particular realization of scientific discourse is presented in a form of a text. The EST text is only one example of scientific texts. To Widdowson (1984), a scientific text is a particular realization of a universal mode of communication since it consists of non-verbal devices such as tables, graphs, and diagrams, which are considered as a neutral form of communication in respect to any language.

Furthermore, Widdowson (1979) distinguishes between three types of scientific discourse: 'science as a discipline', 'science as a subject', and 'science as a topic of interest'. In the first, the scientific discourse/text is directed to peers where there is some assumed-shared knowledge. In the second, the discourse is intended to be used by teachers to science students. The aim of such discourses is to expose students to some basic concepts in science that is why we usually find them in textbooks. The last kind is produced by journalists to laymen, so it is usually found in newspapers or popular journals. It is characterized by tackling scientific topics in general using common language and some sub-technical terms, known as the language of vulgarization.

Focusing on scientific texts in 'science as a subject', Walsh (1982) recognizes three complementary components of the scientific text: the linguistic, the rhetorical, and the conceptual. The linguistic component (text language) has to do with vocabulary and syntax. The first part, vocabulary, refers to both the regularly used specialist vocabulary that is specific to each area and to the sub-technical one, which is "widely used in scientific and technical areas but yet exclusive to none" (Walsh, 1982, p.24). In the same manner, syntax refers to either the most dominant structures used in scientific texts than in others such as 'the passive voice' or to those syntactic structures which belong to no discipline.

The rhetorical component of scientific texts (text style) is basically concerned with the conventional rhetoric of texts in science; that is, the way information is organized and presented to a reader. In this respect, some studies are conducted by each of Selinker (1972) and Trimble (1985) (as cited in Walsh, 1982) who have shown that knowing the rhetorical organization of texts contributes to a great extent in promoting learners' comprehension of scientific texts. Moreover, knowing the reader's reading proficiency and his competence in mastering the language is very important in constructing the rhetoric of scientific texts because, to Walsh (1982), it leads the writer to write in one way rather than another.

Contrary to the above-mentioned components which focus on the text, the conceptual component of a scientific text deals with the sum of the knowledge the reader brings to the text; in simple words, the reader's interpretation of a text. According to Walsh (1982), any difficulty in understanding the conceptual part of a text will inevitably lead to linguistic difficulties and sometimes the inverse holds true. If one can question this last statement, he may say that it is rather the opposite. Most of the time, failing to understand the linguistic or the rhetorical aspects of a text, especially for non-native science learners, is what prevent students from getting the gist of the text, i.e., getting the conceptual aspect of the text. As a matter of fact, concepts are usually realized through using language, so failing to understand the linguistic elements of a text will undoubtedly break down the intended meanings of these concepts.

1.2.3. Difficulties in Reading Scientific Texts

Difficulties in reading scientific texts can rise due to numerous factors. Ignoring text organization and lacking the specific vocabulary are just few factors. Imagine if these two reasons are coupled with lack of proficiency in the foreign language of instruction, of course, things will be tougher for students to hold. Reading scientific texts in a foreign language complicates the situation to learn for science learners who find themselves overwhelmed by obstacles on both sides. On the one hand, they have to understand the new concepts in their subject matter. On the other hand, they have to know the basic elements in the foreign language system that is used as the medium of presentation. Besides, they have to be aware of the conventional rhetoric of science in order to cover all the aspects (knowing the language, knowing the new concepts in their field, and knowing the rhetoric of scientific texts) that help them comprehend effectively.

Wiggin (1977) reports that "many foreign students lack the ability or training to understand the implicit messages that result from an interaction of syntax and rhetoric" (p.4).

This is of course applied to students who study English as their subject matter. In this study, the students of physics are unfortunately unable even to understand the 'explicit' messages, which are indicated by 'explicit' cohesive markers like we are going to see in the chapter of fieldwork. It is so not because they do not study English, but as we understood from them, it is because they did not study English, as it should be either as GE or as EST.

In order to read efficiently in English, students need knowledge of how the English language is used in scientific writing. This includes:

- Knowledge of language itself, its grammatical structure and vocabulary, which are generally found under the heading of GE.
- Knowledge of how these features of language are used in scientific context and in the presentation of information and this can be found under the heading of EST.

Conclusion

In this chapter, we have spotlighted some theoretical issues about the emergence of ESP/EST as language practices to meet the urgent needs of students in learning English for specific purposes. We have also seen the shift from special languages of specialisms towards specific purposes suitable in specific domains. In addition to this, we have discussed the analysis of EST texts from discourse approaches points of view where we have uncovered their efficacy in providing a thorough description of the nature of EST texts to science learners. At the end, we have highlighted one prominent discourse-based analysis (rhetorical approach) that is considered of great significance to non-native learners in facilitating their reading comprehension in scientific English, and in decoding the rhetoric of scientific texts.

We have also focused on the nature of texts in science and some of their characteristics. In a brief discussion, we have tackled some of the difficulties science learners usually meet when they read texts pertaining to their subject matter in English. In this respect and in terms of lack of proficiency in English, students of science suffer from a difficult situation that affects their success in learning physics adequately.

Chapter Two: Reading Comprehension and Textual Cohesion

Chapter Two: Reading Comprehension and Textual Cohesion

Introduction

The appearance of the new approach to teach English for specific purposes brought up an emphasis on one of the four language skills which was neglected for a long time. Reading, contrary to the previous thought, is given a remarkable interest in language teaching as it is no longer considered as a 'passive skill' as opposed to the 'active skills', speaking and writing. The idea that "reading can be understood as an active, purposeful, and creative mental process where the reader engages in the construction of meaning from a text" (Goodman, 1971, p.135) provides the new insights about the process of reading in which the reader becomes the central concern. In reality, readers are not passive receptors since they bring to the reading task some 'prior' knowledge, which in turn helps them to make sense of what they read. This shows that while readers interact with the written texts, some mental processing is going on in their minds. Guessing, predicting, interpreting, and questioning one's self during reading are all instances of what may happen in the readers' mind in their attempt to rebuild the writers' meanings expressed in the text.

This new interest on the 'readers' and on how they construct meanings from texts has contributed to the proliferation of studies on reading not as a 'passive skill' but as an active, creative, and cognitive process. This can be seen in the so many definitions that are given to describe reading. Each definition expresses a certain attitude and thought of the process of reading from a writer's point of view. Nevertheless, no definition is thorough enough to cover all the aspects of the process as it happens in reality simply because of its complexity.

2.1. Definition of Reading

The most common definition of reading is that it is a 'cognitive' activity, which implies a certain amount of thought on the part of the 'reader', and where a kind of

'involvement/interaction' between the reader and the text is taking place to get the meaning out. So, reading is an activity in which readers have to extract and construct meanings from written texts dependent on many psychological, linguistic, and contextual factors. In this respect, Widdowson (1979) (as cited in Carrell et al., 1988) views the reading process

> as not simply a matter of extracting information from the text. Rather, it is one in which the reading activates a range of knowledge in the reader's mind that (…) may be refined and extended by the new information supplied by the text. (p. 56)

In this present study, we will most of all focus on one particular kind of reading which has to do with 'reading the lines' or 'reading in scientific English'. It is 'reading with comprehension'. We believe that exposing F.L scientific learners to instructional information on how to read with comprehension is beneficial for them to overcome their difficulties in reading scientific texts in English.

Indeed, since reading comprehension above sentence-level (discourse level) has moved to another dimension, science learners should be equipped with adequate and possible ways to access discourses. This new consideration becomes the main concern of linguists to help students understand such types of discourse efficiently. Reading with understanding the whole discourse brings to the surface some hidden difficulties that are generally faced by F.L learners who really need to read their academic writings successfully. Hence, understanding the kind of knowledge involved in constructing these linguistic units should be made clear to non-natives to read with maximum comprehension.

2.2. The Reading Comprehension

In this study, we want to spotlight reading that is accompanied by understanding and comprehending a piece of language, i.e., the 'making sense' of what one reads. Most of the

time, reading comprehension is accustomed to be seen as the ability of the reader to answer direct questions that usually follow certain texts, and which contain the same words that are found in the text. However, some studies (Widdowson, 1979; Nuttal, 1982; Smith, 1982) suggest that the ultimate purpose from reading is actually more to comprehend what to read than to merely answer questions. Despite this, the questions are in fact important elements for comprehension because they work as tools for assessing one's ability to comprehend. For this reason, it has been thought that it is likely more beneficial if questions are put before one reads the text to make reading both a 'purposeful' and a more 'meaningful' activity (Harr-Augustein et al, 1982). In the same vein, Smith (1982, p.166) points out that "the twin foundation of reading are to be able to ask specific questions (make predictions) in the first place, and to know how and where to look at print so that there is at least a chance of getting these questions answered."

Being able to comprehend is an essential element in good reading because it indicates the ability of the reader to paraphrase, synthesize the content, answer questions about materials, make predictions and inferences, and of course understand the main ideas and facts. In this respect, reading comprehension as an aspect of language learning is defined as a "careful reading" (McConkie, 1973). That is, when one reads is not only to comprehend the material in hands so that to answer the questions following it, but it is also to memorize the information he gets from the text to be used later on as his background knowledge in a particular topic.

We can say that it is due to the new tendency; that is, the consideration of reading as an 'active skill', linguists such as Perason & Johnson (1978) define reading comprehension as "any reader's interaction with the text". Comprehension, as a matter of fact, is an outcome of a successful interaction between a reader and a writer who mediates through the text. It is evident that one facet of interaction is establishing the logical connections between ideas in a

text. According to Perason & Johnson (1978), readers comprehend a text only when they have understood these connections for reformulating them in another fashion, paraphrasing. In this way, inferences are considered as critical acts of comprehension: if readers are able to identify the relationships between ideas in a text and the logical connectors that indicate them, they will be able to infer the conceptual and structural gaps in the text. Foss & Haykes (1978) claim that if reading comprehension is not based on syntactic, semantic, discourse, and pragmatic, it will definitely lead to short-term retention and memorization.

2.2.1. Reading Comprehension with F.L Physics Students

In the department of physics, University of Constantine, reading with F.L physics students is seen as to solely develop the students' ability to answer exam questions. Because of this, their reading skills are limited to just answering exam questions based on the comprehension of a text at the end of each semester.

In an attempt to improve the comprehension skills, some studies try to find out what skills and strategies that are commonly used by good readers when processing a text. They suggest that it is possible to teach students with reading problems like physics students, for instance, how to develop reading skills and strategies that are proved to be used by good readers. These skills and strategies should be taught through explicit and specific reading constructions. In the following, we will present one model of reading, which is thought to be of great usefulness for F.L learners who need to read in English.

2.2.2. Reading as a Communicative Process

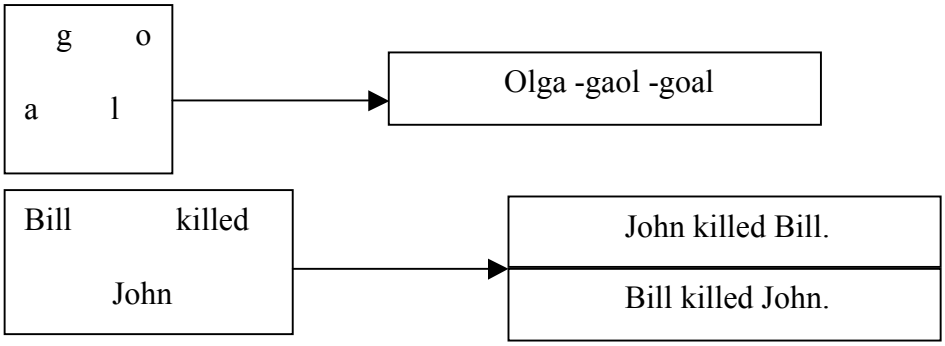
In a series of four books under the title of *Reading and Thinking in English*, Oxford University (1986) provides in the third book *Discovering Discourse* an integrated course in reading comprehension for students of English as a foreign language. This book specifically targets students whose main aim is to gain access to information through English, like

students of physics, because it intends to help them and others read textbooks, works of reference, and scholarly journals in English.

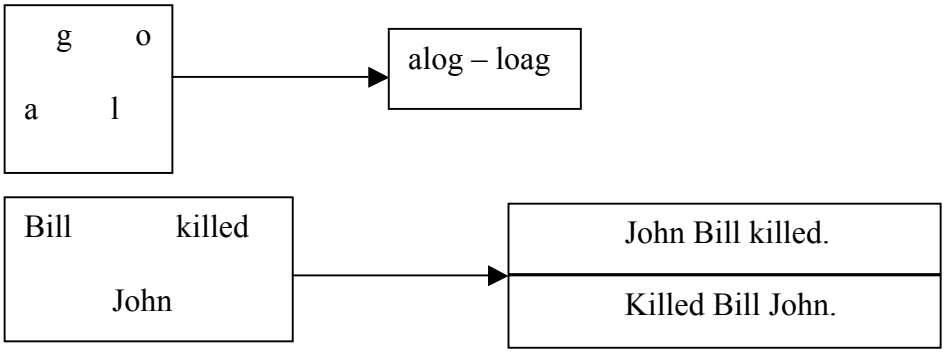
Reading comprehension is seen as a communicative process where the writer communicates something through the text and the reader has to get it by interacting with the text during reading. In order to make readers aware in the process of reading, four reading strategies are introduced. These strategies can help scientific learners to read with comprehension and hence to improve their reading skills efficiently.

2.2.2.1. Understanding Language Patterns

The first strategy for improving the reading comprehension is 'understanding language patterns'. Learners should first be aware of the language patterns that exist in English in order to understand the message. There are situations where the same message can be conveyed using different means: visually (non-linguistically) or linguistically. In science, as a matter of fact, we can use diagrams, maps, graphs, and pictures to communicate a particular message visually. Likewise, we can use words, phrases, and paragraphs to express and present ideas and information by means of linguistic elements. In any language, the small linguistic elements are grouped together into different patterns to produce large units. Some of them are meaningful such as words, phrases, and sentences. For example:



However, not all the patterns make sense or can carry meaning. See the following:



(Oxford, 1986, p.4)

There are rules by which these patterns are constructed in order to guarantee the production of correct forms. Knowing how linguistic elements are combined to make words and sentences, and which of them are meaningful is very important to be a good reader. Understanding the conveyed message of a text (its communicative function) can be achieved when the readers are able to understand the meanings of words and sentences in English. However, reading does not stop at understanding the word and sentence patterns.

In order to present information in a logical way, sentences are usually arranged into larger patterns. It is possible to understand every word in a passage without understanding the message simply because understanding in this case requires knowledge of another level, a discourse level. Comprehending necessitates from readers to know the logical structure of the whole passage, which depends in the first place on how the writer wants to organize and present the information in it. To succeed in establishing this knowledge, the reader has to know the expressions that connect ideas together. The logical structure of a passage is generally signalled by these 'textual connectors' which act as signposts to help readers find their way through the passage.

In sum, the first strategy for improving reading comprehension can be summarized as the following: "Recognize patterns of language inside the sentence and between sentences by

increasing your understanding of vocabulary, grammar and textual connectors" (Oxford, 1986, p.6).

2.2.2.2. Understanding by the Use of Context

Occasionally, there are situations where readers meet words or phrases they do not know, and to overcome such a problem, there are some strategies. One of them is to 'deduce/infer' the meaning of the unfamiliar words and phrases by referring to the neighbouring words and phrases that readers know. The readers can actually benefit from the 'linguistic context' (co-text) of the text by reference to the grammar and connectors in the sentence and within the paragraph. Understanding the relation between the known part of the context and the unfamiliar part helps readers deduce and guess the meaning of the unknown elements.

In brief, the second strategy for improving reading comprehension can be summarized as the following: "Use the information from the context to discover the meaning of unfamiliar words or phrases and to help choose the appropriate meaning from the dictionary" (Oxford, 1986, p.7).

2.2.2.3. Reading with Prediction

Insofar, the above two strategies will help readers to read more 'accurately'. To read more 'fluently', there is another technique that should be used by F.L learners, it is to 'predict' as possibly as one can about what he is reading. The first thing to do is to benefit from the 'title' of the written material (book, article, or passage) because it tells him about the topic. Second, the use of the 'background knowledge' about the topic is another way of possibly and successfully predicting about the content. Third, the 'non-linguistic devices', such as those mentioned in the first strategy, can provide a good context for prediction. Last

but not least, using one's knowledge about the context of texts helps readers in making prediction.

In short, the third strategy for improving reading comprehension can be summarized as the following: "Make predictions about the content of a passage based on:

1. titles and subtitles.
2. your own background knowledge of the topic.
3. non-linguistic context: pictures, diagrams, etc.
4. the linguistic context" (Oxford, 1986, p.8).

2.2.2.4. Purpose in Reading

The final set of strategies that will help learners to read more 'efficiently' is 'reading with a purpose'. We have seen in the first strategy that writers structure information in a way that suits the purpose they have in mind. Similarly, readers have a purpose when they read. Generally, a common purpose in reading is to find out some information apposed to that kind of reading that is for pleasure. In academic settings, the purpose of learners is to find out the needed information that helps them in their studies. One way to make reading an efficient process is the ability to locate information necessary for the reader's purpose in a passage. This sometimes leads the reader to ignore or pass by what is not relevant to his purpose. Reading with purpose shows the possibility that one passage can be read differently by two people simply because they have different purposes in mind.

In a few words, the fourth strategy for improving reading comprehension can be summarized as the following: "Have a clear purpose before reading; locate the parts of a passage which are relevant to your purpose" (Oxford, 1986, p.9).

In short, a good recipe to read 'accurately, fluently, and efficiently' should include the following ingredients:

- Understand language patterns and the use of context.
- Use the topic to read with prediction.
- And do not forget to read with a purpose.

2.3. Text in the Process of Reading Comprehension

Reading comprehension is a highly complex process due to the many variables that contribute to its success. Whether the text is in one's native language or in a foreign language, the process of reading is still a complex one. Generally speaking, reading is a matter of how the reader views and processes the text. This processing needs knowledge of how texts are structured by writers. Once the reader is able to recognize the text as a hierarchy of different units at different levels (from words to sentences to paragraphs to discourses), he will be capable of analyzing it as a whole mass that needs to be decomposed into smaller components easy to understood. This linguistic knowledge is an important aspect in the process of reading comprehension (Demel, 1990). In this respect, Levenston, Nir, and Kulka (1984) (as cited in Pugh & Ulijn, 1984) share this view by saying that:

> studies in text processing have shown that in the overall understanding of a text, the reader processes information both on the micro-level of single proposition (realized in words and sentences) and on the macro-level of discourse units (realized in intersententially connected stretches of text). (p.203)

However, we should note that in a good reading, interaction demands another kind of knowledge. Widdowson (1983) points out that the text itself does not carry meaning but rather it provides clues (through cohesion and text structure) that enable readers to extract meaning from the text and then construct it in their minds using their existing knowledge. This is what has been clarified in the definition of reading. Interaction during reading is, as a matter of fact, a process of combining textual information with the knowledge the reader brings to the text.

Therefore, the linguistic knowledge of the text should be recognized alongside with readers' prior knowledge about what they read.

2.3.1. Textual Cohesion

Cohesion has been described in a number of ways. McCarthy (1991) defines it from a grammatical point of view as any surface marking of semantic links between clauses and sentences in a written discourse. He emphasizes the idea that it is due to the grammar of English, a limited set of choices can be offered to create this link. Moreover, such link is achieved only by cohesion, which is displayed from sentence to sentence by means of grammatical features such as pronominalisation, ellipsis, and conjunction. According to Widdowson (2006), cohesion is the recognition and identification of connections that are signalled linguistically such as, for example, between a pronoun and a previous noun phrase.

2.3.2. Cohesion as a Component of a Text

Cohesion is a part of text structure that is generally recognized by analyzing the text beyond sentence level. It is hard to grasp the existence of a text that is more than two sentences without the presence of cohesive ties. They are elementary items for the construction of a text in the same manner a thread for the sewing up of a dress. Cohesive ties bind the different parts of a text just like the thread when it connects the separate parts of a cloth to make a unified piece of clothes. Therefore, there is no doubt that cohesion is an essential aspect of a written text. For this reason, texts cannot be analyzed without taking in consideration these devices; neither can one bear in mind the understanding of a text fully in their absence. That is why whenever one discusses the structure of texts, cohesion is always part of that discussion.

Yule (2006) also attributes to the notion of cohesion; however, he is interested more with the role it plays in the interpretation of a text. He mentions that interpreting a text relies

on more than merely knowing the function of ties and connections that exist within texts. He makes it clear that we can produce a text that is highly cohesive though it is very difficult to interpret. He illustrates this point by giving the following two texts:

Text # 01

My father once bought a Lincolin convertible. He did it by saving every penny he could. That car would be worth a fortune nowadays. However, he sold it to help pay for my college education. Sometimes I think I'd rather have the convertible.

(Op. cit., p.125)

Text # 02

My father bought a Lincolin convertible. The car driven by the police was red. That color doesn't suit her. She consists of three letters. However, a letter isn't as fast as a telephone call.

(Op. cit., p.126)

It is evident that both texts are highly cohesive, i.e., each sentence is linked to previous sentence by means of cohesion, except the first one. Nevertheless, while the first text sounds correct, the second is definitely without sense. This explains his point in which the interpretation of a text is not based only on connections between words. From this, he concludes that cohesion by itself is not enough to enable the reader to make sense of what he reads, 'coherence' or the making sense of what to read is another factor that enables him distinguishing the connected texts that make sense from those that do not.

In the same vein, Widdowson (2009) distinguishes between cohesion and coherence in terms of the illocutionary act and the proposition. Cohesion deals with how the propositions are linked together to form texts meanwhile coherence has to do with how the illocutionary function of these propositions are used to create different kinds of discourse. Accordingly, the notion of cohesion "refers to the way sentences and parts of sentences combine so as to ensure that there is propositional development" (p.26).

2.3.2.1. Cohesion as Seen by Halliday and Hasan

Studies on cohesion show that there is a debate among scholars about whether cohesion differs from coherence, such as according to Yule (2006), or that cohesion is only one part/component of coherence. Halliday & Hasan (1976) are among those who view cohesion as the basis of coherence in a text because they claim that a text is coherent due to cohesion and some other factors. For that matter, readers should establish knowledge of how cohesion works in English. According to Halliday & Hasan (1976), cohesion occurs

> where *interpretation* of some element in the discourse is dependent on that of another. The one *presupposes* the other, in the sense that it cannot be effectively decoded except by recourse to it. When this happens, a relation of cohesion is set up, and the two elements, the presupposing and the presupposed are thereby at least potentially integrated into a text. (p.4)

Since the interpretation of the presupposing element (like a pronoun) depends on the presupposed one (like its referent), this points out that Halliday & Hasan do consider cohesion as a component of coherence in the sense that coherence is achieved through the semantic consistency between both elements. When writers want to make their writings readable, they try to write in a coherent way by using cohesive ties.

The readability of a text is basically dependent on the logical connection of information that is generally achieved by cohesion. Halliday & Hasan (1976) state that sentences are glued by a number of cohesive ties to form a 'semantic' unity and not a purely 'structural' one. They assert that cohesion is "a semantic relation between an element in a text and some other element that is crucial to the interpretation of it" (p.8). This highlights the fact that cohesion is by no means a structural relation or a consequence of coherence, but it is rather a relation of meaning, which plays a crucial role in making of sense of the text.

Therefore, the simplest definition of cohesion is that it "refers to the relations of meaning that exist within the text and that define it as a text" (Halliday et al., 1976, p.4). So according to Halliday et al., what makes a text as text is cohesion since it plays a role in distinguishing the cohesive grammatical unit from a random collocation of sentences. That is why a text for them is a semantic unit, which its parts are linked by explicit cohesive ties.

2.3.2.2. Cohesive Ties

To Halliday et al. (1976), a cohesive tie is the basic unit of text's analysis in terms of its cohesive properties. The explicit nature of these devices is what makes the tracing of the relationships between ideas in a text easy. Training scientific learners to identify them and recognize their functions can hopefully qualify them to be able to realize the implicit messages and to decode the relations that generally found in scientific texts common to their fields of study. In other words, recognizing the cohesive ties in texts means that students' ability to cope with units larger than sentences is improved and polished.

Halliday and Hasan (1976) identify and recognize five major classes of cohesive ties: *reference*, *substitution*, *ellipsis*, *conjunction*, and *reiteration and collocation (lexical cohesion)*. While substitution and ellipsis are more frequent in spoken discourse than in the written one, the remaining types (reference, conjunction, and lexical cohesion) are frequently found in the written discourse. Reference and conjunction contains both kinds of ties, grammatical and lexical compared to lexical reiteration and collocation, which are exclusively limited to lexical ties. The ability to identify these devices and their referents is quite significant in promoting the reading comprehension of the students. In this respect, Demel (1990) states that "the readers' ability to link a pronoun with the concept referred to by the author is a crucial component of the reading process" (p.268).

2.3.2.2.1. Reference

Reference cohesion refers to those items in a text that point to other elements that are crucial to their interpretation. Although reference is a semantic relation, it is expressed by grammatical units in the sense that "the reference item is no way constrained to match the grammatical class of the item it refers to. What match is the semantic properties" (Halliday & Hasan, 1976, p.32). This means if the referent (Malak) is the subject of the sentence, its reference in the following sentence (*her*) should not obligatory follow the grammatical function of it (subject) since it may occur as an object, but it keeps its semantic characteristics (referring to a singular and feminine animate noun).

E.g. Malak brought a little homeless dog to the house.
The dog had not left *her* since then.

(Our example)

Reference ties are classified into three types *pronominals*, *demonstratives and definite articles*, and *comparatives*. In the following sentence-pairs, each case is illustrated separately. (These sentences and the coming ones in the next sub-sections are all taken from "Coherence, Cohesion, and Writing Quality" by Witte & Lester, 1981).

(1) At home, my father is himself.
(2) *He* relaxes and acts in *his* normal manner. (*Pronominal*)

(3) We question why they tell us to do things.
(4) *This* is part of growing up. (*Demonstratives*)

(5) Humans have many needs, both physical and intangible.
(6) It is easy to see *the* physical needs such as food and shelter. (*Definite articles*)

(7) The older generation is often quick to condemn college students for being carefree and irresponsible.
(8) But those who remember their own youth do so *less* quickly. (*Comparatives*)

(Witte & Lester, 1981, p.191)

It is obvious from the above examples that the italic elements in sentences (2), (4), (6), and (8) refer to elements already exist in sentences (1), (3), (5), and (7) respectively. The interpretation of the former is critically dependent on the latter. Reference ties are said to be easy to locate but knowing their referents is the striking process because it has a great effect on the comprehension of a text.

2.3.2.2.2. Substitution

Substitution is the act of replacing one element in a text with another one that is not a personal pronoun, to avoid ambiguity with reference. Contrary to reference, the substitute item should have the same grammatical function as the one it substitutes. In addition to this, substitution differs from reference in the sense that it does not refer to a specific entity, but rather to a class of items or one type of object. The role of substitution is to guarantee the extension of the textual or the semantic domain of one sentence to a subsequent one. To illustrate the effect of substitution, the following sentence-pair does that perfectly:

(9) Did you find a lawnmower?
(10) Yes, I borrowed *one* from my neighbor. (*Substitution*)

(Witte & Lester, 1981, p.191)

The italic item in (10) does not refer to a specific element in (9). The word *one* substitutes a kind of grass-cutting machine that is available but not necessary refers to a particular one. We can figure this out from the use of the indefinite article 'a' in (9). If *it* is used instead of *one* in (10), this means that there is a specific (lawnmower) in mind and both speakers are aware of. Moreover, both of *one* in (10) and (a lawnmower) in (9) function as an object.

2.3.2.2.3. Ellipsis

Ellipsis is the act of eliminating a part of a message that is mentioned before to maintain textual cohesion. The effect of ellipsis is to "create cohesion by leaving out [some element that] can be taken over from preceding discourse" (Halliday et al., 1976, p.206). The difference between substitution and ellipsis is that ellipsis equals 'substitution by zero' as Halliday et al. put it, because it involves a deletion of a word, phrase, or clause.

In this respect, Halliday et al. (1976) state that "ellipsis can be the familiar notion that it is 'something left unsaid'. There is no implication here that what is unsaid is not understood; on the contrary, 'unsaid' implies 'but understood nevertheless'" (142). To illustrate this point concretely, the word *do* in sentence (12) illustrates cohesion by means of ellipsis:

(11) Do you want to go with me to the store?
(12) Yes, I *do /(want to go with you to the store).* (*Ellipsis*)

(Witte & Lester, 1981, p.191)

In this example, we can see that though some elements are omitted (want to go with you to the store) which are already mentioned in (11), the message is still understood by the use of the word *do* in (12), which substituted a whole clause.

2.3.2.2.4. Conjunction

Comparing conjunction with reference, substitution, and ellipsis shows that there is a difference between conjunction and the other ties in terms of the nature of the semantic relation of conjunction. There is a kind of order by which two sentences are linked by one of these ties must occur such as, for example, the typical order of a pronoun to come either after the referent (anaphorically) or before it (cataphorically). However, there is no bound-order with the use of conjunctions. Halliday & Hasan clarify this by saying that "two sentences may be linked by a time relation, but the sentence referring to the event that is earlier in time may

itself come later, following the other sentence" (1976, p.227). This comes from the fact that conjunctive elements are not by themselves cohesive, but rather they do "express certain meanings which presuppose the presence of other components in the discourse" (Halliday & Hasan, 1976, p.226).

Conjunctive cohesion is divided into five types *additive*, *adversative*, *causal*, *temporal*, and *continuative*. The following sentence-pairs illustrate, in each pair, how the meaning of one sentence is extended by each type of conjunction to the subsequent sentence:

(13) No one wants to be rejected.
(14) *And* to prevent rejection we change our behaviour often. (*Additive*)

(15) Small children usually change their behaviour because they want something they don't have.
(16) Carol, *however*, changed her behaviour because she wanted to become part of a new group. (*Adversative*)

(17) Today's society sets the standards.
(18) The people more or less follow it.
(19) *Consequently*, there exists the right behaviour for the specific situation at hand. (*Causal*)

(20) A friend of mine went to an out-of-state college.
(21) *Before* she left, she expressed her feelings about playing roles to win new friends. (*Temporal*)

(22) Different social situations call different behaviours.
(23) This is something we learn as children and we, *of course*, also learn which behaviours are right for which situations. (*Continuative*)

(Witte & Lester, 1981, pp.191-192)

From this set of examples, we can notice that whether conjunctions are coordinating (such as *and*, *but*, and *so*), conjunctive adverbs (such as *however*, *consequently*, and *moreover*), and temporal adverbs or subordinating (such as *before*, *after*, and *now*), they all function as cohesive ties across 'sentence boundaries'.

2.3.2.2.5. Lexical cohesion

The last type of cohesive ties indicates cohesion by means of lexical relations. Lexical cohesion is achieved by the selection of vocabulary and put it in a particular pattern to create a cohesive effect. Similar to conjunction, lexical items are not themselves cohesive. The striking difference between these two kinds of cohesive ties is that lexical elements are potentially cohesive if they are used in a particular pattern. For example, if we encounter the conjunctive adverb *however*, we try directly to establish an *adversative* relationship between two text-elements. On the other hand, lexical cohesion depends on some "patterned occurrence of lexical items" (Halliday & Hasan, 1976, p.228).

This 'patterned occurrence' is described by Halliday & Hasan as *reiteration* and *collocation*. Reiteration is a generic term that refers to a repetition of the *same item*, or by a *synonym*, *superordinate*, or *general word*. It is defined as a form of lexical cohesion which

> involves the repetition of a lexical item, (…); the use of a general word to refer to a lexical item, at the other end of the scale; and a number of things in between-the use of a synonym, near-synonym, or superordinate. (Halliday & Hasan, 1976, p.178)

Lexical reiteration is usually easy to identify, we can see this in the following sentence-pairs. An example of *synonymy* is in the sentences (24) and (25) with the synonyms (ascent) and *climb*.

(24) The ascent up the Emmons Glacier on Mt. Rainier is long but relatively easy.

(25) The only usual problem in the *climb* is finding a route through the numerous crevasses above Steamboat Prow. (*synonymy*)

(Witte & Lester, 1981, p.192)

An example of the other three cases of lexical reiteration is illustrated as the following:

(26) Some professional tennis players, for example, grandstand, using obscene gestures and language to call attention to themselves.

.

(27) Other *professional athletes* do similar *things*, such as spiking a football in the end zone, to attract *attention*. (*Superordinate*, *general term*, and *same item*)

(Witte & Lester, 1981, p.192)

The phrase *professional athletes* in (27) is a term which encompasses many items that share the quality of being a 'professional sport player'. For this reason, it is considered the superordinate of the phrase (professional tennis players) in (26). In contrast, the word *things* in (27) refers to a general term that is usually used to point undefined items. In this sentence, it refers anaphorically to two behaviours in (26), (using obscene gestures and language). The difference between a *superordinate* and *general term* lies on the fact that while the former is exclusively a name of a specific class of objects (sport players, for instance), the latter is more inclusive and it is not restricted to any specific set of objects that is why it is general. The remaining relationship (*same item*) is illustrated in both sentences (26) and (27) with the same-item repetition: *attention*, which is simply repeated.

Collocation is the other lexical cohesive relationship that is achieved through **"**the association of lexical items that regularly co-occur**"** (Halliday & Hasan, 1976, p.283). Compared to lexical reiteration, collocation is the most difficult type of cohesion to analyze because it does not involve any kind of repetition. The most important aspect of collocation is that the items **"**share the same lexical environment**"** (Halliday & Hasan, 1876, p.286). The sentences (28) and (29) illustrate this point clearly:

(28) On a camping trip with their parents, teenagers willingly do the household chores that they resist at home.

(29) They gather *wood for a fire*, help put up the *tent*, and carry *water from a creek or lake*. (*collocation*)

(Witte & Lester, 1981, p.193)

The cohesion between (28) and (29) comes up from the associations of the italic elements in (29) which are always co-occur in a (camping trip). However, it is not always easy to identify the co-occurring elements, especially if they are culturally bound or not commonly known.

To conclude, what has been said so far about cohesion shows the importance of it in the recognition of a text as a semantic unit compared to a sequence or a jumble of unrelated sentences. Cohesion is a critical property of the text and because of its objectivity in analysis, we can recognize text's cohesion automatically (using software programs such as the Coh-Metrix). Coherence, on the other hand, is often co-occurring with the notion of cohesion. It is said that coherence is one facet of the reader's evaluation of a text. Indeed, compared to cohesion, it is subjective and judgements concerning it may vary from one reader to another.

2.4. Cohesion in Reading Comprehension

Insofar, there is no doubt that there is a relation between the presence of the reading skills, the familiarity with the linguistic features, and the successful comprehension. Learners need to be equipped by these complementary elements to be able to read, *and* to comprehend as well. Studies on reading comprehension have shown a lot about how cohesion is an important factor in the development of reading as it contributes substantially to text's readability (Chapman, 1986; Irwin, 1986; McNamara et al., 2003; Ozuru et al., 2009).

Chapman and Irwin (1986) show the importance of cohesion to reading and comprehension. They focus on pointing out how the perception and understanding of cohesion functions can contribute to improve and promote comprehension in the reading process. Chapman's findings demonstrate how the recognition of cohesive relations in a text develops as soon as the students mature as readers. His study highlights the point that says that readers have actually shown growth in their abilities to perceive cohesion in texts and even to use it as a strategy to support comprehension. He concludes that readers do not solely

develop an awareness of cohesion over time, but also use it frequently to get meaning from print.

Irwin's findings, on the other hand, demonstrate that if we increase the level of cohesion in a text, this will promote wordiness and facilitate the comprehension of a text. As a consequence of which, Irwin claims that since cohesion evidently plays a central role in reading, writers should increase the amount of ties so that readers could understand a text more fully and easily.

Likewise, McNamara, Best, and Castellano (2003) agree that the function of cohesive ties is to pave the way to readers in order to easily and straightforwardly understand the relation between ideas. In effect, terms like 'because' and 'consequently', for example, help the reader understood that the relation between the concepts is a causal one. For this reason, they recommend to rewrite poorly written texts in a more cohesive manner for the sake of providing readers with easy-access to information needed for comprehension.

Conclusion

In this chapter, we have seen the importance of reading in learning a foreign language. Focusing on reading comprehension, we have shown its significance to scientific learners and how to read for the sole aim of comprehending and not answering questions. We have presented four reading strategies, which we believe can improve the reading comprehension of learners who need to learn how to read in the first place. We have also pointed out to the role of a text in reading comprehension, and how lacking knowledge about its linguistic characteristics can obstruct comprehension.

Since the focus of this study is on cohesion, we have described it in a detailed fashion presenting examples taken from major studies on cohesion. We have finally tried to show the importance of cohesion to reading and how it is useful in promoting the comprehension of a text.

Chapter Three: Fieldwork

Chapter Three: Fieldwork

Introduction

This chapter is concerned with investigating some of the issues that are dealt with in this study. It is devoted to describe the experiment and the used tools for the investigation. This research hopes to spotlight the real level of the students of physics in reading and how they struggle to understand a text in English. For that matter, a questionnaire and a test are used to uncover the reading difficulties physics students encounter when they read in English. According to the results, we will try to identify the causes behind such a failure to comprehend scientific texts written in English. All the findings that are obtained from both means of research are presented and discussed qualitatively and quantitatively.

3.1. Population, Sampling, and Randomization

This study is conducted in the department of physics at the University of Constantine. The research population represents the "first year Master students of physics". In the general introduction, we have mentioned the reasons behind choosing this particular level, i.e., first year M.A. where we have stated in particular the following reasons:

1. They have already studied EST (English for Science and Technology) for two years: at the third year B.A. and first year M.A..
2. They are supposed to be sufficiently proficient at least in General English to understand a simple scientific text and to recognize its organization.
3. These students are not tabula rasa; they have certain background knowledge about English and know the elements of the language such as some basic grammatical rules and a certain amount of vocabulary.

First year Master students are divided into three main groups where each group studies a specific speciality/option in physics. We have:

• Group (1) consists of twenty-three students in *Physique des particules élementaires*.
• Group (2) consists of fourteen students in *Energétique et énergies renouvelables*.
• Group (3) consists of eight students in *Physique des couches mines*.

The whole population consists of forty-five students who are more or less homogeneous. They all have the same problems in reading scientific texts.

For sampling, we have chosen randomly twenty students. This randomisation was based on selecting the students from the option *Physique des particules élementaires* because their number exceeds twenty, and they are the only group who studies physics theoretically. The other two options are more concerned with the practical side of physics. Subsequently, group (1) is basically more interested in reading comprehension.

3.2. Tools of Research

For the research, we have used a questionnaire and a test. We first start with the questionnaire, which we administered to students, and then it is followed by the test.

3.2.1. The Students' Questionnaire

3.2.1.1. Description of the Questionnaire

The questionnaire is designed to have an access to students' opinions and attitudes towards learning and reading in English. It is also used to know their performance in English, their reading situation and the difficulties they generally face in English. Furthermore, it seeks to know their personal ways of solving problems of comprehension, and more importantly whether they are aware of the English cohesive ties and their functions to the overall meaning of the text. The questionnaire consists of fourteen closed questions of both a multiple choice type where students have to select one out of several answers, and some of the 'yes'/'no' type. The language of the questionnaire is simple to make it easy to understand by the students.

The purpose of the questionnaire is to investigate the performance of physics students in English and to view their areas of difficulties. The results will help us to highlight their problems and difficulties regarding the reading comprehension.

3.2.1.2. Administration of the Questionnaire

We have administered the questionnaire around the middle of the second term of the academic year (2009-2010). We have explained whenever needed the questions, and students were given enough time to answer. While answering, we kept an eye on them to guarantee that each student works on his own without looking on the others' answers. Before collecting the papers, we have asked them to check that they answered all the questions.

3.2.1.3. Analysis of the Results

For the analysis, we have gone through the questionnaire (cf. Appendix 1) in the following fashion.

Question 01:

We wanted to know whether the students of physics have a motive to learn English. Their answers gave the following results.

Table 1: Motivation to Learn English

Yes	No	Total
16	04	20
80%	20%	100%

Of the total respondents (N=20), 80% have answered that they do have a motive to learn English, whereas 20% of them are not motivated to learn English.

Question 02:

With this question, we sought to know the degree of the students' awareness about the importance of integrating the learning of a foreign language within the scientific modules.

Table 2: The Importance of English for Science Learners

Yes	No	Total
13	07	20
65%	35%	100%

65% of the total respondents admitted by saying ‘yes’, against 35% answered by ‘no’.

Question 03:

To get insights about the students’ level in English, we asked students whether they are sensitive to their performance in English. The results of this question are as the following.

Table 3: Students’ Level in English

Good	Average	Bad	Total
03	07	10	20
15%	35%	50%	100%

Of the total respondents, 50% have bad/low level in English, followed by 35% who claimed that they are neither good nor bad, against 15% who saw themselves as good in English.

Question 04:

In order to know about their reading situation, we asked students if they usually read in English.

Table 4: Reading in English

Yes	No	Total
08	12	20
40%	60%	100%

60% of the total respondents have answered ‘no’, versus 40% of them who said ‘yes’.

Question 05:

When asked about the frequency of reading in English, students' answers came complementary to those in question 04.

Table 5: The Reading Frequency in English

Frequently	Sometimes	Rarely	No Answer	Total
02	04	09	05	20
10%	20%	45%	25%	100%

45% of the total respondents rarely read, followed by 25% who did not give answers. We have also 20% who sometimes read, against 10% who read frequently.

Question 06:

This question is concerned with knowing the kind of documents students usually read to get information.

Table 6: Documents to Read

Physics textbooks	Articles given by teachers	Online articles	No answer	Total
09	05	03	03	20
45%	25%	15%	15%	100%

45% of the total respondents read English textbooks that have to do with their field of study, followed by 25% who read texts or articles given by their teachers. 15% of them read articles from the Internet, whereas the other 15% gave no answers.

Question 07:

In an attempt to find out the reasons that led the students to read in English, we asked them why they have to read in English in particular.

Table 7: The Purpose from Reading in English

Get information not available in French or Arabic	Write scientific reports	Pass examination	Prepare their dissertation	Total
11	00	03	06	20
55%	00%	15%	30%	100%

Out of 20 students, 55% answered that they read in English in order to get information not available in French or Arabic, 30% said it is to prepare their dissertation next year, and 15% said that they need English to answer exam questions.

Question 08:

When asked about how often they face problems of comprehension during reading, the students respond as the following.

Table 8: The Frequency of Reading Problems

Often	Sometimes	Rarely	Never	Total
13	06	01	00	20
65%	30%	05%	00%	100%

Of the total respondents, 65% answered 'often', 30% of them claimed that they sometimes face difficulties in reading, against 5% (one student) who said that he rarely faces problems. However, no one pretended that they have no reading problems.

Question 09:

To know the source of the comprehension problems, we have asked students to tell us about their source of problems and difficulties in reading scientific texts in English.

Table 9: The Causes of the Problems in Reading

Lack of proficiency in English	Insufficient field knowledge	Ignorance of text organization in science	Disability to understand scientific language	Total
12	01	04	03	20
60%	05%	20%	15%	100%

60% of the total students linked their problems of understanding to lack of knowledge in the English language, 20% chose ignoring the organisation of scientific texts as an account of their weaknesses. 15% of them claimed that they are unable to understand the language of science such as terminology or to interpret graphs and diagrams, etc., while 5% (one student) selected the insufficient knowledge in physics as the reason behind his problems of understanding.

Question 10:

To further diagnose the causes behind such difficulties, we have asked the students to select the exact problematic areas in reading.

Table 10: The Most Problematic Areas for the Students

General vocabulary	Scientific terminology	Sentence structure in science	Cohesive ties	Total
09	02	03	06	20
45%	10%	15%	30%	100%

45% of the total respondents found difficulties with general vocabulary, 30% said that their problems are because of elements for linking sentences like conjunction. 15% of them chose the structure of sentences in scientific writing, against 10% who saw that their problems are due to the scientific terminology.

Question 11:

To have an idea about what the students usually do to solve their comprehension problems, we asked them about which strategies they usually follow to overcome some of their difficulties.

Table 11: Strategies Used for Comprehension

Read more than once	Relate each sentence to previous ones	Guess the general meaning from titles & known words	Rely on connectors like pronouns and conjunction	Total
11	03	05	01	20
55%	15%	25%	5%	100%

55% of the total respondents read more than once in their attempt to understand a text, 25% try to understand through guessing the general idea of the text using the title and the familiar words. 15% of them relate sentences together to reach logical connections, whereas 5% (one student) preferred to rely on connectors as a way to solve his comprehension problems.

Question 12:

In order to explore students' degree of awareness about sentence connectors in English, we asked them whether they know the English cohesive ties.

Table 12: Awareness about the English Cohesive Ties

Yes	No	Total
07	13	20
35%	65%	100%

Of the total respondents (N=20), 65% have no idea about the English cohesive ties, against 35% who admitted they know these devices.

Question 13:

This question aims to evaluate whether students know the importance of cohesion in reading. Their answers brought out the following results.

Table 13: The Importance of Cohesive Ties to Understanding

Yes	No	Total
14	06	20
70%	30%	100%

70% of the total respondents are aware of the significance of cohesion to understanding, while only 30% have answered 'no'.

Question 14:

As a last question, we have asked students about their needs in learning the language, which is proved to be the medium of research and science.

Table 14: Students Needs from Learning English

Terminology	Text structure	Grammar & vocabulary	Total
08	02	10	20
40%	10%	50%	100%

50% of the students expressed their needs to master the English grammar & vocabulary. 40% of them said they need to learn terminology that have to do with their field of study, while the 10% remaining said they want to learn about the structure of texts.

3.2.1.4. Discussion of the Results

The first remark that can be drawn is somehow optimistic. Indeed, we have found out that physics students are interested to study English. The results in (Table 1), for example, show that the majority of the students are motivated to learn English. These results reveal that

the students become sensitive to the importance of English in their studies. We can see this evidently in (Table 2) where the big proportion of the students expressed their stands that they do consider English as important as the other modules. If we go back a couple of years earlier, we would unlikely hear such claims as presented by the findings of some previous theses concerning this idea. It seems that students of physics are now more aware that the English course is not useless to study or a waste of their time as they sometimes say. This is actually a good perspective the students have about learning English, which means that they have a good purpose in learning, not just for having a pass mark.

However, one should notice that despite this awareness, the students' level in English is still not that good (Table 3). Indeed, 55% of the students admitted that their performance in English is bad/low, which is not surprising at all when we take into account that only 40% of them read in English (Table 4). Of course, we cannot ignore the reality that there are many factors that may lead to such results. The quality of the English course is likely one of them. If the students were exposed to a course that is particularly designed for them as science learners *per se*, things would perhaps be different. When the students are asked about the English course they attend, we understood from them that they find the English session boring because they said they study English in an old fashion where the course focuses on identifying some grammatical rules and terminology. This situation may explain why they have such a poor level in English.

As far as reading is concerned, the respondents' answers reveal that the majority do not read in English, and if they read, they do rarely so (Tables 4 & 5). What they generally read are documents that have to do with their field of study (Table 6). In other words, these students do not bother themselves to read different documents that can help them enrich their general vocabulary, but they read only when they are obliged to either for examinations or for

research and tests. So, again this could be a logical explanation for their bad performance in English.

When asked about the purpose for reading textbooks of physics, they answered that they need them to be able to get information not available in French or Arabic (Table 7). Though 30% of them asserted that they need to read in order to be prepared to work on their dissertation next year, for Master students to do their M.A. research in English. They should be ready to write and read in English, as a compulsory language.

In an attempt to diagnose the causes behind their failure to comprehend a scientific text in English, the results of (Table 8) illustrate that the majority of the students with 65% stated that they often have problems of understanding. According to them, such problems are 60% due to lack of proficiency in the English language, followed by 20% due to ignoring the organization of texts in science, i.e., the rhetoric of scientific writing (Table 9). These two causes are in fact typical aspects in learning science in a foreign language. However, the big problem lies on the fact that there is no planned English course/syllabus in the department of physics, as we believe.

Another confirmation about this situation is the answers in (Table 10). The majority of the students said that their weakness is with general vocabulary and cohesive ties rather than scientific terminology. Generally speaking, science learners do not have problems with terminology or with information that have to do with their study, their problems are actually with the foreign language of instruction and how this language is organized and presented in science. Problems of terminology can be easily solved by looking for the difficult words in a bilingual dictionary or just comparing them to their French equivalents (cognates), as Hutchinson & Waters (1987) have pointed out saying that: “technical terms are (…) likely to pose the least problems for learners: they are often internationally used or can be worked out from a knowledge of the subject and common word roots” (p.166).

Concerning the students' ways of solving problems of comprehension, the results of (Table 11) indicate that the majority of the students (55%) read more than once to get the gist of the text, followed by 25% who benefit from the title and the familiar words in order to read with prediction. However, it seems that these students know very little or nothing about cohesion in the sense that they barely use or rely on connectors like pronouns and conjunction to overcome their difficulties (Table 11). We should bear in mind that these devices are proved by many studies (Chapman, 1986; Irwin, 1986; McNamara et al., 2003; Ozuru et al., 2009) that they are of great efficacy for the students who have comprehension problems in reading. These guiding tools can help students improve their comprehension level, but which is not the case with our research students.

Actually, we have found out that the students did not use cohesive ties because they do not know them, and because they cannot differentiate between linkers and other language categories like prepositions and demonstratives. This is what the results in (Table 12) have showed. Indeed, 65% of the respondents do not know what the English cohesive ties are although they admitted that they are aware of their importance for comprehension (Table 13). Once again, the lack of knowledge of the cohesive ties and their functions is another outcome of a poor syllabus design of the English course. When we asked the students about what they need to learn in English, 50% stated that they desire to learn grammar and vocabulary, but not in the boring fashion they used to do (Table 14).

To sum up, the results of the questionnaire reveal the serious problems first year Master students of physics have. They have a poor performance in English, and serious comprehension difficulties. Nevertheless, they seem to be eager to learn English as they become sensitive to its importance to their studies, and hence they hope to do that in an efficient and modern way.

3.2.2. The Test

3.2.2.1. Description of the Test

The test is the other means of research that we have used in addition to the questionnaire. It provides us with a picture of the students' level of comprehension. The test consists of three reading comprehension tasks: there are three passages to read followed by two sections for each passage, each of which assesses the comprehension of the students at a different level.

The three passages are taken from a series of six books all under the topical title *Light and Matter* by Benjamin Crowell. For diversity, we preferred to take each text from a different book. All the topics are easy to understand in term of their contents for the students because they handle basic topics in general physics in which first year Master students were already exposed to during their B.A. courses.

Each task goes in two sections. In the first section, students are asked to respectively identify the precise reference (the referent) of some pronouns, and to indicate the function of some conjunctions as used in the text. Both the pronouns and conjunctions are identified in the text, the former are underlined and written in bold and the latter are written in bold only to make them easy to locate. The purpose of this section is to see if first year Master students are capable of identifying the English cohesive ties and their functions in a text.

In the second section, we have asked respectively seven comprehension questions in Task # 1, six in Task # 2, and eight in Task # 3. Some of the questions are of the indirect type and require full understanding of the passage. To answer the questions, the students should locate the specific information in each text. The purpose of this section is to see whether the students are able to refer to different parts of the passage to look for the correct answers.

To give a detailed description of how this test functions, each task is as the following:

• **Task # 1:** consists of an authentic passage under the title of "What is Physics?" from *Newtonian Physics*. This text is *average* in cohesion. As a matter of fact, the scientific text is known for its moderation in the use of cohesion for its construction, so it is basically neither high nor low in cohesion. In science, writers use a certain amount of cohesive ties to express the logical connections between the scientific facts. Therefore, this passage is not supposed to be difficult to comprehend, nor excessively easy. Seven comprehension questions are asked in this task.

• **Task # 2:** consists of an adapted passage entitled "Atoms: Atomism" from *Electricity and Magnetism*. This text has been adapted to produce *low* cohesion text, which is supposed to be difficult to understand. This text, too, is followed by six comprehension questions.

• **Task # 3:** consists of an adapted passage entitled "Work: the Transfer of Mechanical Energy, the Concept of Work" from *Conservation Laws*. This passage is also adapted but it is to produce *high* cohesion text, which is supposed to be relatively easy to understand due to the number of cohesive markers. In this task, we have asked eight comprehension questions.

3.2.2.2. Administration of the Test

The test was given to students as homework. We have explained to them what to do in each reading task. In addition, we have given them one week time to do the homework.

We have given the test as homework for the following reasons. First, the test is too long for one session per week, and so there is no chance to do it as a classwork. Second, when we have checked the students' timetable, we found out that it is too loaded, so it is unlikely to force them to have an extra-session for doing a test that consists of three reading tasks. Consequently, since it is impossible to do it in class, we will take the advantage to see how students read and think at home as they used to do for their homework assignments. In other words, it is an opportunity to discover how students read at home where they have the possibility of using dictionaries freely to look for the difficult words. However, we know that -as homework- students are likely not to do it seriously, and this is an unwanted variable, which for the requirements of the present research it will not be taken into consideration.

3.2.2.3. Analysis of the Results

For the analysis of the results, each reading task is marked separately out of twenty points, and hence we dealt with each task separately. At the end, we compared the achievement of the students in the three reading comprehension tasks, and came out with one general appreciation of the results.

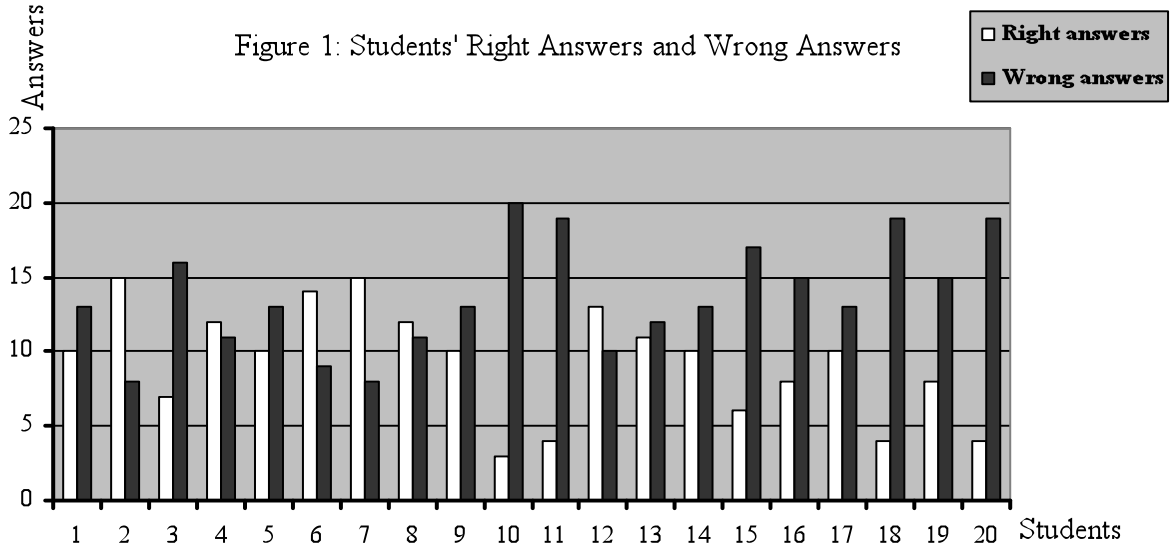
• **Task # 1** (cf. Appendix 2)

We have put in (Table 15) the number of the right answers versus those of the wrong answers, followed by the total score of each student (out of 20 points). Certainly for different reasons students may leave blanks, one of which might be that they do not know the answer, and thus the "no answers" are included with the wrong answers; and for ease of calculating the scores, we have just considered blanks as wrong choices. In this task, students should answer twenty-three items to get the full mark (20).

Table 15: Students' Scores in the Reading Task # 1

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	10	15	7	12	10	14	15	12	10	3	4	13	11	10	6	8	10	4	8	4
Wrong answer	13	8	16	11	13	9	8	11	13	20	19	10	12	13	17	15	13	19	15	19
Total answers	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Score/20	**8.5**	**13**	**5.5**	**10**	**9**	**12**	**14**	**11**	**8**	**3**	**4**	**11.5**	**9**	**9**	**6**	**7**	**8.5**	**4**	**6**	**3**

We can see that the highest score is (14) which is obtained by only one student, against the lowest score (3) that is gotten by two students. The remaining scores are ranging from (4 to 9) as far as those who got below (10), and from (10 to 13) for those who obtained the average and above the average. Figure 1 complements the Table and shows the results.



Looking at this graph, we can see that the columns of the wrong answers are most of the time taller than those of the right answers. This shows the weak performance of the majority of respondents in this task. We can see this in (Table 16) below.

Table 16: The Percentage of the Scores

Score/20	Average/above average	Below average	Total
Ns	06	14	20
%	30%	70%	100%

Out of the total respondents (N=20), 70% obtained below the average, whereas only 30% got the average or beyond the average.

In the following, the task is going to be decomposed to its smallest sections where we are going to analyse them section by section.

Section One:

In this section, we wanted to assess students' knowledge concerning the English cohesive ties. We have chosen the pronouns and conjunctions; the two ties that are generally

used in scientific texts. This section is marked on thirteen points (10 for question 1 & 3 for question 2).

In the first question, we asked students to identify the referents of ten pronouns in the text. This means that for each correct referent, they get one point that is ten points for this question. The results are summarized as follows.

Table 17: Identifying the Referent of the Pronoun

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	4	6	1	4	4	5	7	5	4	0	1	6	3	5	2	5	3	0	2	0
Wrong answer	6	4	9	6	6	5	3	5	6	10	9	4	7	5	8	5	7	10	8	10
Total answers	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Score/10	**4**	**6**	**1**	**4**	**4**	**5**	**7**	**5**	**4**	**0**	**1**	**6**	**3**	**5**	**2**	**5**	**3**	**0**	**2**	**0**

We can see that the highest score is (7/10) which is obtained by only one student, against the lowest score (0) that is gotten by three students. The remaining scores are ranging from (1 to 4) as far as those who got below (5), and from (5 to 6) for those who obtained the average and above the average in this question.

Table 18: The Percentage of the Scores

Score/10	**Average/above average**	**Below average**	**Total**
Ns	07	13	20
%	35%	65%	100%

65% of the students are not able to identify the referents of the majority of the pronouns in the text, whereas only 35% who could approximately identify half or more of the total number of the referents.

For the second question, we asked students to put each conjunction for its right function. We have listed six functions and we have chosen some conjunctions that are

indicated in bold in the text to make students select the appropriate conjunction for its appropriate function in the text. This means that six right answers received three points, as (Table 19) illustrates.

Table 19: Indicating the Function of the Conjunction

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	3	4	3	4	2	4	2	2	4	0	0	3	4	2	0	2	3	0	4	2
Wrong answer	3	2	3	2	4	2	4	4	2	6	6	3	2	4	6	4	3	6	2	4
Total answers	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Score/03	**1.5**	**2**	**1.5**	**2**	**1**	**2**	**1**	**1**	**2**	**0**	**0**	**1.5**	**2**	**1**	**0**	**1**	**1.5**	**0**	**2**	**1**

We can see that the highest score is (2/3) which is obtained by six students, against the lowest score (0) that is gotten by four students. The remaining scores are (1) for those who got below (1.5), and (1.5) for those who obtained the average in this question.

Table 20: The Percentage of the Scores

Score/03	**Average/above average**	**Below average**	**Total**
Ns	10	10	20
%	50%	50%	100%

In (Table 20) above, the number of the students who got the average and above the average is equal to that of those who failed to obtain it.

Section Two:

To assess the comprehension level of students, we have asked them seven different comprehension questions from the text. Each question received one point; so seven correct answers received seven points. Some of the questions are not direct where we have substituted some words with their synonyms or they are described using some other words. In this section, we want to see if students are capable of using their cognitive skills to understand

the text fully to be able to locate the exact information needed. (Tables 21 & 22) illustrate the results.

Table 21: The Comprehension Questions

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	3	5	3	4	4	5	6	5	2	3	3	4	4	3	4	1	4	4	2	2
Wrong answer	4	2	4	3	3	2	1	2	5	4	4	3	3	4	3	6	3	3	5	5
Total answers	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Score/07	**3**	**5**	**3**	**4**	**4**	**5**	**6**	**5**	**2**	**3**	**3**	**4**	**4**	**3**	**4**	**1**	**4**	**4**	**2**	**2**

In Section Two, the highest score is (6/7) which is obtained by only one student, against the lowest score (1) that is also gotten by one student. The remaining scores are ranging from (2 to 3) as far as those who got below (3.5), and from (4 to 5) for those who obtained the average and above the average.

Table 22: The Percentage of the Scores

Score/07	**Average/above average**	**Below average**	**Total**
Ns	11	09	20
%	55%	45%	100%

In the comprehension question section, 55% of the total respondents have answered correctly, and got the average and above the average, but none of them gave full answers (the seven answers) as (Table 21) shows. 45% of them, however, obtained below the average as it is indicated in (Table 22).

The scores of both sections are compared to each other to see where the students have worked better. To show this relationship, the scores of all the students in both sections are illustrated in (Table 23).

Table 23: Comparison between Both Sections of Task # 1

Students	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Section one/13	5.5	8	2.5	6	5	7	8	6	6	0	1	7.5	5	6	2	6	4.5	0	4	1
Section two/07	3	5	3	4	4	5	6	5	2	3	3	4	4	3	4	1	4	4	2	2
Score/20	**8.5**	**13**	**5.5**	**10**	**9**	**12**	**14**	**11**	**8**	**3**	**4**	**11.5**	**9**	**9**	**6**	**7**	**8.5**	**4**	**6**	**3**

In Section Two, the majority of the students (11 out of 20) took good marks, ranging from (4 to 6), whereas (4 out of 20) students took good marks in Section One, ranging from (7 to 8), as (Table 24) shows.

Table 24: The Percentage of the Scores

Task 1	Section one		Section two		
Score/ 20	Average/ above average	Below average	Average/ above average	Below average	Total
Ns	04	16	11	09	20
%	20%	80%	55%	45%	100%

While 80% of the total respondents (N=20) got below average in Section One, 45% of them obtained below average in Section Two. In contrast, 55% of them obtained the average and above the average in Section Two, against 20% who got the average and above the average in Section One.

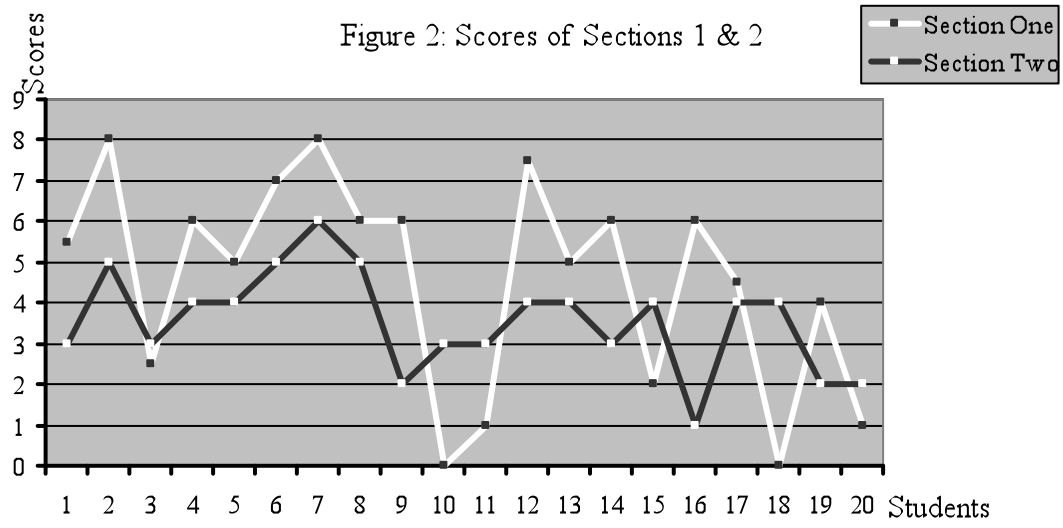


Figure 2 shows the scores of the students as they are compared in both sections to indicate the relationship between both sections visually.

As this graph indicates, there are four (4) black squares above the average line of Section One, which indicate that only four students could get the average and above the average in Section One. Compared to this, we have eleven (11) white squares above the average line of Section Two, which indicate that the majority of the students (11 out of 20) could get the average and above the average in Section Two.

• **Task # 2** (cf. Appendix 3)

What has been done for analysing Task # 1 is also adopted here to analyse this task. For this, we have summed up the results in term of scores as in (Table 25). In this task, there are twenty items that need to be answered in order to get the full mark (20 points). (Table 25) consists of the number of the right answers versus the wrong answers, followed by the total score of each student out of twenty.

Table 25: Students' Scores in the Reading Task # 2

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	8	11	6	9	7	10	12	8	7	5	4	13	8	9	5	5	7	2	5	4
Wrong answer	12	9	14	11	13	10	8	12	13	15	16	7	12	11	15	15	13	18	15	16
Total answers	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Score/20	**8**	**11**	**6**	**9**	**7**	**10**	**12**	**8**	**7**	**5**	**4**	**13**	**8**	**9**	**5**	**5**	**7**	**2**	**5**	**4**

Only one student got (13) as the highest mark, and also one student got the lowest mark, which is (2). The remaining scores are ranked from (4 to 9) for those who got below (10), and from (10 to 12) for those who got the average and above the average.

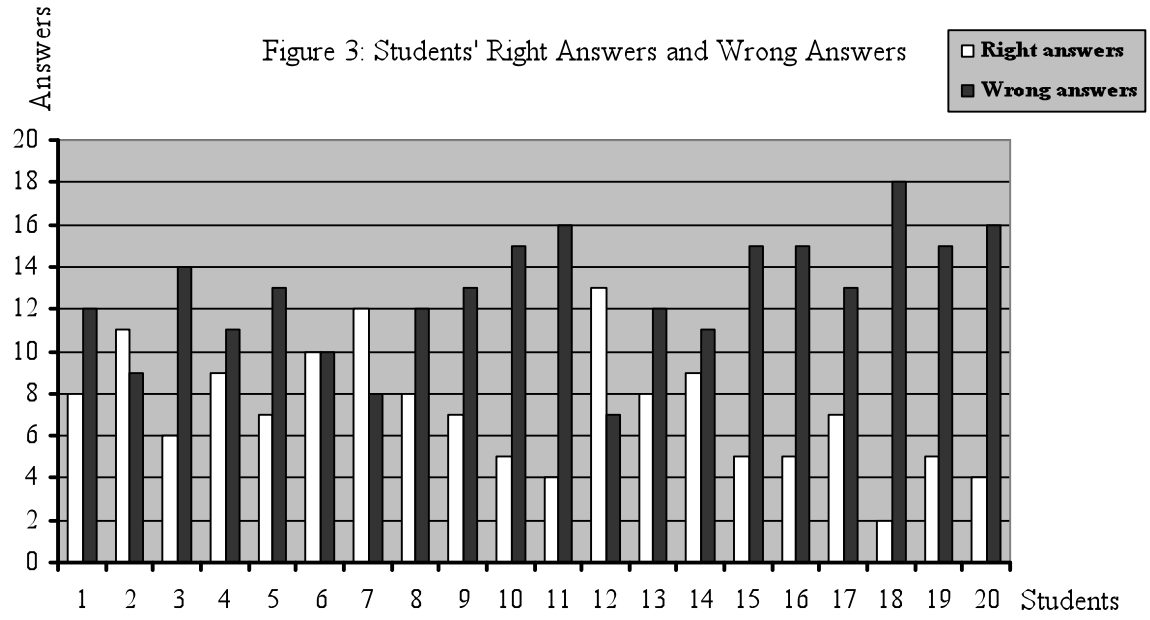


Figure 3 shows the difference between the numbers of right answers and the wrong answers.

Once again, the columns of the wrong answers are most of the time much taller than that of the right answers. This indicates that the number of wrong answers exceeds the number of right answers once again in this task, as (Table 26) shows.

Table 26: The Percentage of the Scores

Score/20	Average/above average	Below average	Total
Ns	04	16	20
%	20%	80%	100%

80% of the total respondents failed to obtain the average, against 20% who obtained the average and above the average.

In the following, the task is analysed section by section to reveal the students' performance in each section.

Section One:

This section is marked out of fourteen, a point for each item to answer. In the first question that is concerned with identifying the referent of the pronoun, we have six pronouns, each of which is marked on one point.

Table 27: Identifying the Referent of the Pronoun

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	1	4	2	1	1	4	3	2	1	3	0	4	4	4	2	1	3	1	0	0
Wrong answer	5	2	4	5	5	2	3	4	5	3	6	2	2	2	4	5	3	4	6	6
Total answers	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Score/06	**1**	**4**	**2**	**1**	**1**	**4**	**3**	**2**	**1**	**3**	**0**	**4**	**4**	**4**	**2**	**1**	**3**	**1**	**0**	**0**

The highest score is (4/6) which is obtained by five students, against the lowest score (0) that is gotten by three students. The remaining scores are ranging from (1 to 2) as far as those who got below (3), and (3) for those who obtained the average in this question.

Table 28: The Percentage of the Scores

Score/06	**Average/above average**	**Below average**	**Total**
Ns	08	12	20
%	40%	60%	100%

As the results of (Table 28) illustrate, 60% of the students are unable to find what the pronouns refer to in the text, against 40% who obtained the average and above the average for the same question.

For the second question, there are eight functions, which need to be filled up by their corresponding conjunctions. This question is marked on eight points.

Table 29: Indicating the Function of the Conjunction

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	3	2	2	3	3	2	3	4	0	0	1	4	3	2	1	0	2	1	2	0
Wrong answer	5	6	6	5	5	6	5	4	8	8	7	4	5	6	7	8	6	7	6	0
Total answers	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Score/08	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**4**	**0**	**0**	**1**	**4**	**3**	**3**	**1**	**0**	**2**	**1**	**2**	**0**

The highest score is (4/8) which is obtained by two students, against the lowest score (0) that is gotten by four students. The remaining scores are ranged from (1 to 3) for those who got below (4), and (4) for those who obtained the average in this question.

Table 30: The Percentage of the Scores

Score/08	**Average/above average**	**Below average**	**Total**
Ns	02	18	20
%	10%	90%	100%

90% of the total respondents did not know the functions of the majority of the conjunctions, while only 10% of them (two students) have obtained the average in this question.

Section Two:

Concerning the comprehension questions, we have asked six questions. This section is marked out of six points.

Table 31: The Comprehension Questions

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	4	5	2	5	3	4	6	2	6	2	3	5	1	3	2	4	2	0	3	4
Wrong answer	2	1	4	1	3	2	0	4	0	4	3	1	5	3	4	2	4	6	3	2
Total answers	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Score/06	**4**	**5**	**2**	**5**	**3**	**4**	**6**	**2**	**6**	**2**	**3**	**5**	**1**	**3**	**2**	**4**	**2**	**0**	**3**	**4**

In Section Two, the highest score is (6/6) which is obtained by two students, against the lowest score (0) that is gotten by one student. The remaining scores are ranging from (1 to 2) as far as those who got below (3), and from (3 to 5) for those who obtained the average and above the average.

Table 32: The percentage of the Scores

Score/06	Average/above average	Below average	Total
Ns	13	07	20
%	65%	35%	100%

As in Section Two in Task # 1, the majority of the students (65%) got the average and above the average in the comprehension question section, against 35% who obtained below the average as we can see from (Table 32).

The scores of the two sections are compared to know where the students have worked better, in Section One or in Two as (Tables 33 & 34) and Figure 4 show.

Table 33: Comparison between Both Sections of Task # 2

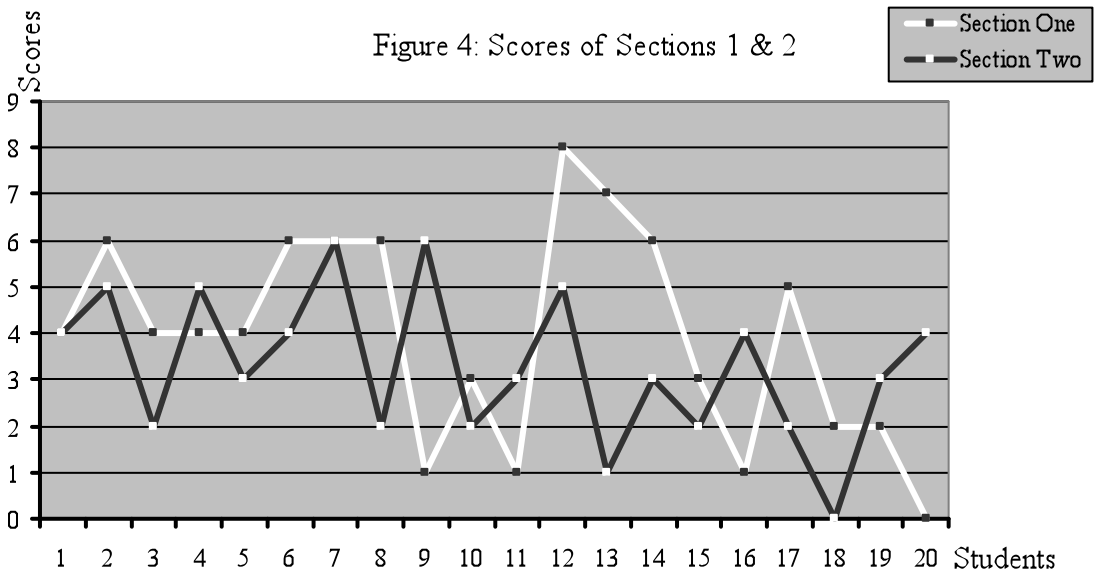
Students	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Section one/14	4	6	4	4	4	6	6	6	1	3	1	8	7	6	3	1	5	2	2	0
Section two/06	4	5	2	5	3	4	6	2	6	2	3	5	1	3	2	4	2	0	3	4
Score/20	**8**	**11**	**6**	**9**	**7**	**10**	**12**	**8**	**7**	**5**	**4**	**13**	**8**	**9**	**5**	**5**	**7**	**2**	**5**	**4**

In Section Two, the majority of the students (13 out of 20) took good marks, from (3 to 6), where as few of them (2 out of 20) took good marks in Section One, from (7 to 8).

Table 34: The Percentage of the Scores

Task 2	Section one		Section two		
Score/ 20	Average/ above average	Below average	Average/ above average	Below average	Total
Ns	02	18	13	07	20
%	10%	90%	65%	35%	100%

Once more, the results of (Table 34) show that while the majority of the students (90%) did not work well in Section One, 65% of them got the average in Section Two, as Figure 4 shows.



The graph indicates that there are two (2) black squares above the average line of Section One, which indicate that only two students could get the average and above the average in Section One. Compared to this, we have thirteen (13) white squares above the average line of Section Two, which indicate that the majority of the students (13 out of 20) could get the average and above the average in Section Two.

• **Task # 3** (cf. Appendix 4)

We have summed up the results of Task # 3 in term of scores (Table 35). In this task, there are twenty-four items that need to be answered in order to get the full mark (20 points).

Table 35: Students' Scores in the Reading Task # 3

Students	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Right answer	12	19	11	13	15	18	15	16	9	10	7	15	12	8	10	11	11	6	8	3
Wrong answer	12	5	13	11	9	6	9	8	15	14	17	9	12	16	14	13	13	18	16	21
Total answers	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Score/20	**10**	**13**	**8**	**10.5**	**11**	**15**	**13**	**12**	**7**	**6.5**	**6**	**12**	**9.5**	**7**	**8**	**9**	**9.5**	**6**	**6**	**3**

Only one student got (15) as the highest mark, while the lowest mark is (3) that is also gotten by one student. The remaining scores are ranked from (6 to 9.5) for those who got below (10), and from (10 to 13) for those who got the average and above the average.

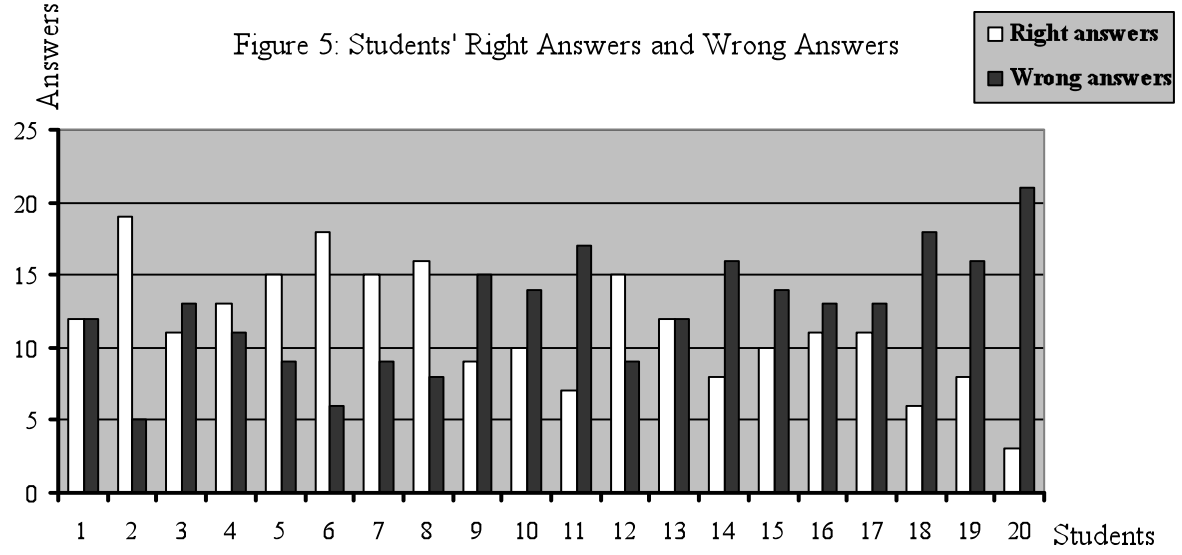


Figure 5 gives a visual picture that shows the difference between the numbers of right answers and the wrong answers as they are obtained in this particular task.

We can see that the columns of the wrong answers are slightly taller than that of the right answers for approximately each student, as (Table 36) shows.

Table 36: The Percentage of the Scores

Score/20	Average/above average	Below average	Total
Ns	08	12	20
%	40%	60%	100%

Of the total respondents, 60% failed to obtain the average, against 40% who succeeded and so obtained the average and above the average.

In order to go in detail through this task, it is analysed section by section to reveal with maximum accuracy their performance in each section.

Section One:

This section is marked on twelve where there are sixteen items to answer. In the first question (identifying the referent of the pronoun), we have six pronouns, each of which is marked on one point except one pronoun which is marked on two points because it needs a focus to locate what it refers to in the text. So this question is marked on seven points.

Table 37: Identifying the Referent of the Pronoun

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	3	2	1	4	4	5	4	3	2	1	2	1	5	2	1	3	1	2	2	0
Wrong answer	3	4	5	2	1	1	2	2	4	5	4	4	1	4	5	3	5	4	4	6
Total answers	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Score/07	**3**	**3**	**1**	**5**	**4**	**5**	**5**	**4**	**2**	**2**	**3**	**2**	**5**	**2**	**1**	**3**	**2**	**2**	**2**	**0**

The highest score is (5/7) which is obtained by four students, against the lowest score (0) that is gotten by one student. The remaining scores are ranging from (1 to 3) as far as those who got below (3.5), and (4) for those who obtained the average in this question.

Table 38: The Percentage of the Scores

Score/07	**Average/above average**	**Below average**	**Total**
Ns	06	14	20
%	30%	70%	100%

As the results of (Table 38) illustrate, 70% of the total respondents (N=20) did not find what the pronouns refer to in the text, against 30% who obtained the average and above the average.

In the second question (indicating the function of the conjunction), there are ten different functions (5 points) that need to be filled up by their corresponding conjunctions.

Table 39: Indicating the Function of the Conjunction

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	4	8	6	5	8	6	4	8	0	7	2	6	5	2	4	4	3	0	4	0
Wrong answer	6	2	4	5	2	4	6	2	10	3	8	4	5	8	6	6	7	10	6	10
Total answers	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Score/05	**2**	**4**	**3**	**2.5**	**4**	**3**	**2**	**4**	**0**	**3.5**	**1**	**3**	**2.5**	**1**	**2**	**2**	**1.5**	**0**	**2**	**0**

The highest score is (4/5) which is obtained by three students, against the lowest score (0) that is gotten by three students. The remaining scores are from (1 to 2) for those who got below (2.5), and from (2.5 to 3.5) for those who obtained the average and above the average in this question.

Table 40: The Percentage of the Scores

Score/05	**Average/above average**	**Below average**	**Total**
Ns	09	11	20
%	45%	55%	100%

55% of the total respondents (N=20) failed to obtain the average in this question, while 45% of them have obtained the average and above the average.

Section Two:

We have asked eight comprehension questions. This section is marked on eight points.

Table 41: The Comprehension Questions

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Right answer	5	6	4	3	3	7	6	4	7	1	2	7	2	4	5	4	6	4	2	3
Wrong answer	3	2	4	5	5	1	2	4	1	7	6	1	6	4	3	4	2	4	6	5
Total answers	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Score/08	**5**	**6**	**4**	**3**	**3**	**7**	**6**	**4**	**7**	**1**	**2**	**7**	**2**	**4**	**5**	**4**	**6**	**4**	**2**	**3**

In Section Two, the highest score is (7/8) which is obtained by three students, against the lowest score (1) that is gotten by one student. The remaining scores are ranging from (2 to 3) as far as those who got below (4), and from (4 to 6) for those who obtained the average and above the average.

Table 42: The percentage of the Scores

Score/08	**Average/above average**	**Below average**	**Total**
Ns	13	07	20
%	65%	35%	100%

Once more, the majority of the students (65%) got the average and above the average in the comprehension question section, against 35% who obtained below the average. However, no one answered the eight questions correctly.

To show the performance of the students in each section, the scores of the two sections are compared to know where the students worked better. (Tables 43 & 44) and Figure 6 illustrate this comparison as follows.

Table 43: Comparison between Both Sections of Task # 3

Students	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Section one/12	5	7	4	7.5	8	8	7	8	2	5.5	4	5	7.5	3	3	5	3.5	2	4	0
Section two/08	5	6	4	3	3	7	6	4	7	1	2	7	2	4	5	4	6	4	2	3
Score/20	**10**	**13**	**8**	**10.5**	**11**	**15**	**13**	**12**	**9**	**6.5**	**6**	**12**	**9.5**	**7**	**8**	**9**	**9.5**	**6**	**6**	**3**

In Section Two, the majority of the students (13 out of 20) took good marks, ranged from (4 to 7), where as some of them (7 out of 20) took good marks in Section One, ranged from (7 to 8), as (Table 44) shows.

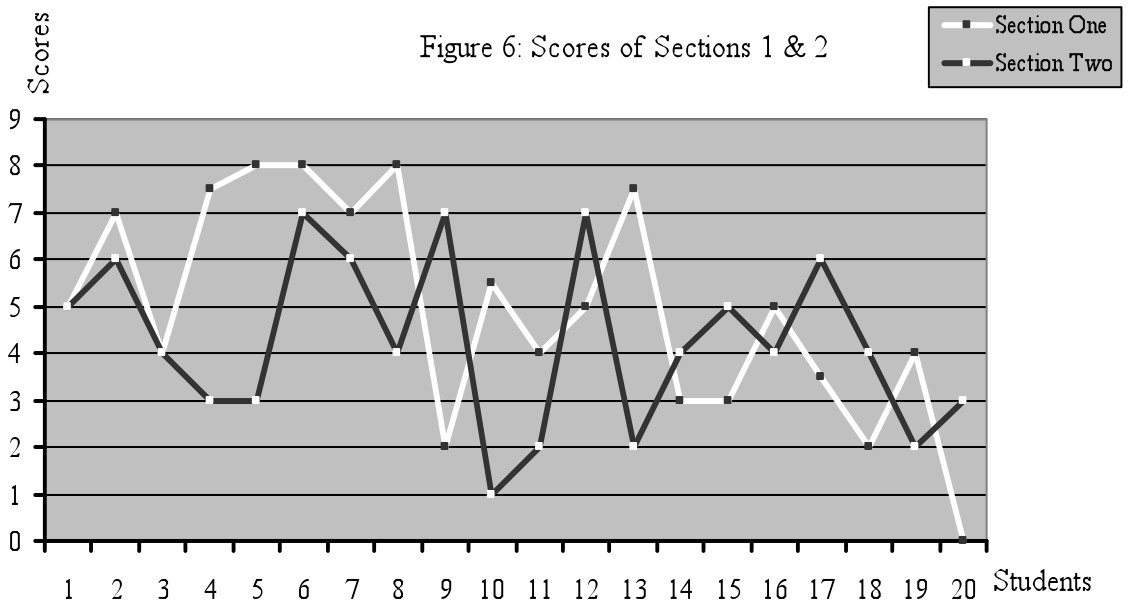
Table 44: The Percentage of the Scores

Task 3	Section one		Section two		
Score/ 20	Average/ above average	Below average	Average/ above average	Below average	Total
Ns	07	13	13	07	20
%	35%	65%	65%	35%	100%

While the majority of the students (65%) did not work well in Section One, the same proportion of the students did well (65%) in Section Two, and hence got the average in this section. 35% of the students found difficulty in answering the questions which are based on text comprehension (Section Two), while the same amount of the students did not find any difficulty in identifying some of the identified cohesive ties in Section One.

Despite the results in each section, the students did not work well in the overall task. We can see the results of both sections in Figure 6 where the scores of Section One are compared with those of Section Two.

Figure 6: Scores of Sections 1 & 2



The graph above shows that there are seven (7) black squares above the average line of Section One, which indicate that seven students got the average and above the average in Section One. Compared to this, we have thirteen (13) white squares above the average line of Section Two, which indicate that the majority of the students (13 out of 20) could get the average and above the average in Section Two.

3.2.2.4. Discussion of the Results

To begin with, it is very important to say that the results of this test are not expected from a work done at home over a period of one week time. If such results were obtained during class time, we might excuse them for the unwanted variables that would affect their comprehension as noise, and lack of time. For that matter, we think that the most probable reason behind such results may be their poor level in English.

As far as results are concerned, the majority of the students obtained below the average in the three reading tasks (Tables 16, 26, & 36). Such results are actually not surprising if we consider their level in English. Indeed, when we have compared the number of the right answers versus the wrong answers, we have found out that the number of the wrong answers is most of the time greater than that of the right answers (Figures 1, 3, & 5).

In Task # 1, the students did not work well in comprehending the text that is supposed to be medium for understanding. Only 30% of them succeeded in this task as the results in (Table 16) show. In Task # 2, the students again failed where 80% could not comprehend a scientific text that is low in cohesion as it is expected (Table 26). However, the students' performance in the Third Task is relatively good compared with both other tasks (Table 36). Though most of the students got below the average (60%), the number of those who got the average (40%) in this task exceeds the number of those who do so in Task # 1 (30%) and in Task # 2 (20%).

In fact, the results students have obtained in Section One of each task are what let us wonder what they do in the English session, the majority of the students are unable to identify what the pronouns refer to in the text (Tables 18, 28, & 38). Worse, the majority of students ignore the functions of the majority of the used conjunctions in each text (Tables 20, 30, & 40). Thus, ignoring these ties could be what has led the students to obtain below average in this particular section (Tables 24, 34, & 44). So, we can conclude from these findings that first year Master students have no idea whatsoever about cohesion.

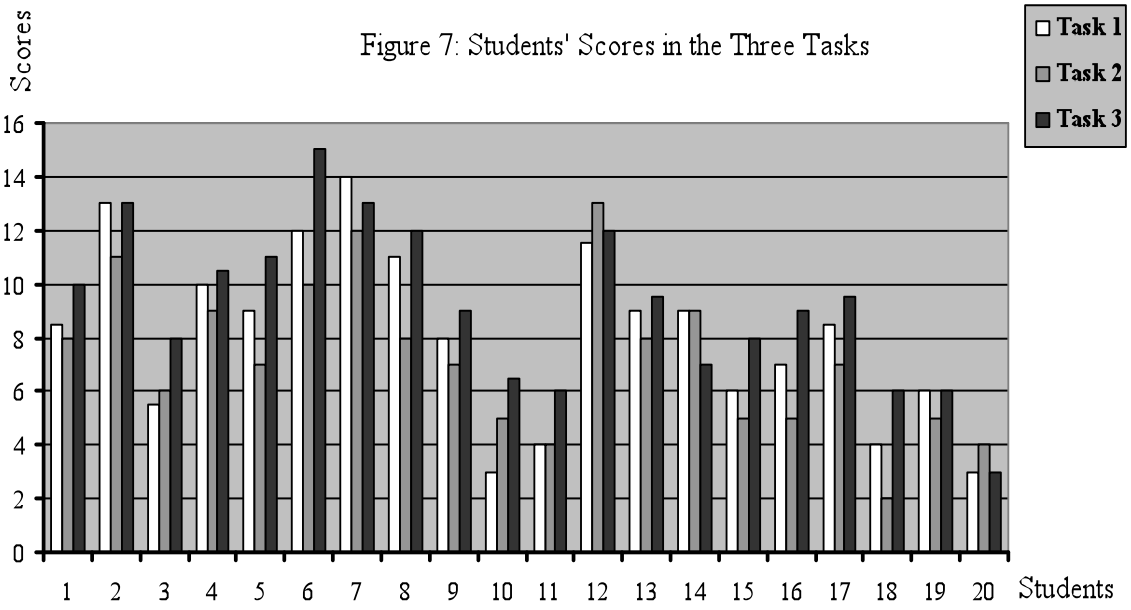
The results of (Tables 22, 32, & 42) allowed us to find out that a considerable number of students (55% in Task # 1, 65% in Task # 2, & 65% in Task # 3) succeeded in answering some of the questions. However, what we have noticed from their answers in Section Two, the comprehension question section, is that they are unable to write a simple correct sentence. Most of the time, they took the information ad verbatim from the text and then placed it under the corresponding question. This means that the students do not really understand the question or the text, but rather depend on the wording of the question and go to the text to see where the answer occurs. This could mean that students answer without [really] thinking.

That is, concerning students' performance in the comprehension question section, we have at first explained their performance in this particular section apparently as that the students found answering the comprehension questions easier than identifying the ties and their functions in the text. But, when we have seen their responses in the comprehension questions, we found out that students did not actually understand the text, but rather copied the answers from the text to their corresponding questions as they are. In other words, they depend on the similar words that are found in both the question and the text. So, once again this reveals that physics students are not able to understand a simple question, which can be answered from the text.

To confirm our results in both sections, we have compared the results of Section One with those of Section Two to see the relationship between them (Tables 24, 34, &44). In other words, it is very interesting to know the level of the students in each section in order to have a general idea of the whole situation. More specifically, we wanted to know if the students relied on cohesion to comprehend the scientific text. What we have found out is that the students have worked better in Section Two than in Section One (Figures 2, 4, & 6). However, seeing their bad performance in Section One indicates that they did not use cohesion to overcome any kind of comprehension difficulties.

In an attempt to compare the results of the three tasks, the scores of students are not decisive at all to say where the students have worked well because the results show similarities more than differences (Figure 7). The low level of the students in English could explain this situation in general, and in knowing the English cohesive ties -of our interest in this present research- in particular.

In other words, on students' performance in the whole test, we have made the following observations. As a first step, we have compared the scores of students in the three reading tasks in order to see how they are worked in the whole test. We should bear in mind that this test is basically concerned with knowing where the students are going to work better. That is to say, which text is easier or more difficult to understand. It is the low, the average, or the high cohesion text. Figure 7 shows the scores of the three tasks in term of columns.



As the histograms show, the results are not quite decisive to point out that the text which is high in cohesion is the easiest text, and that the low cohesion text is the most difficult one because of the poor performance of the majority of the students in the test as a whole. We can see evidently that the results of each student in the three tasks are relatively similar. To say it in another way, it is clear that students who worked badly in the First Task did work badly in the Second and in the Third, too. The same is true with those who have more or less worked well in the First Task, they worked well in the Second and in the Third as well.

Hence, we cannot generalize and say that the high cohesion text is as easy or difficult as the low cohesion text, but what we can say is the fact that first year Master students are really poor in cohesion. However, we can notice from the above Figure that the majority of the students worked slightly better in Tasks # 1 & # 3 compared with Task # 2, which is low in cohesion, but once again the difference is not quite revealing to show the distinction or to over generalize.

In brief, what we can derive from the results of this test is that the most difficult problem of the students is with answering questions in which the words are different from those occurring in the passage. Moreover, we have revealed much about the English cohesive ties where we have found that the majority of the students face huge problems. They seem as if they had not practiced in identifying the cohesive ties (reference & conjunction). We believe that the poor performance of the students in reading comprehension is directly connected to how reading is taught in classrooms. Many think that teaching reading equals developing pronunciation, vocabulary, and grammar. However, the role of teachers in reading comprehension is not to explain a certain passage or to develop certain 'language' skills (such as speaking and listening), but rather to train learners to search for certain linguistic clues (like cohesion) that may help them get the global meaning of the text, where some 'reading' skills, such as scanning and skimming, should be developed during the process.

Conclusion

This chapter is a description and an analysis of both tools of research (the questionnaire & the test) in which we illustrated their functions to the overall study. By analysing the questionnaire, we have come up with a global idea about how learning science in a foreign language takes place in the department of physics, and the common problems the students face in this learning situation. On the other hand, the results of the test, too, provided us with a picture about the reading difficulties and the actual level of the students in English.

Our experiment has revealed some of the most problematic areas for the students: the English cohesive ties. In this respect, we have concluded that the basic cause behind such weaknesses is their low level in General English in the first place and in English for Science and Technology in the second place.

General Conclusion and Recommendations

Our present study was devoted to investigate why Master students of physics are unable to understand when they read scientific texts in English. In an attempt to locate the specific problematic areas that usually block their comprehension, we have asked a critical question of whether science learners in our case are aware of the importance of textual cohesion and cohesive ties to comprehend successfully. To answer this question, we have hypothesised that if Master students of physics understand textual cohesion, it will help them ameliorate their level in English.

Before putting our hypothesis into test, we have presented theoretical background about some issues that are relevant to reveal our purpose and to understand better the surrounding setting of our study. In Chapter One, we have discussed the most important aspects of EST and the scientific text. In addition, we have highlighted some of the reading difficulties that are generally linked with learning a science in a F.L situation.

In Chapter Two, we have clarified how to read with comprehension, and we suggested a model of reading, which is based on four reading strategies that proved to be suitable to students who are with reading problems. Besides, we have discussed textual cohesion in an exhaustive way, first as a critical component of a text, and second as a system of connection. To point out the close relationship between reading comprehension and cohesive ties, we have presented some of the studies that have shown the role of cohesion in promoting the comprehension level of students who suffer from problems of comprehension.

In Chapter Three, our fieldwork, we have provided thorough description of the questionnaire and the reading comprehension test. Then, we have analysed the results in order to provide an accurate analysis that helps in obtaining valuable data. Last but not least, we have come out with the final conclusion that the main obstacle of comprehension is actually

the poor level of physics students in English where we have found that they know little about the English cohesive ties. So, how they are supposed to understand the meaning of a text if they ignore the function of those items that bind the ideas together in the text in the first place.

Putting the findings of both tools together, we have found that the results are in our favour and hence confirm our hypothesis. That is to say, these findings have described the students' low level in English, especially their weakness in understanding the English cohesive ties and their functions in the text. It is this weakness which leads the students to fail in comprehending a scientific passage in English, and thus to answer the comprehension questions. Subsequently, there is no doubt that if these students mastered well textual cohesion, it would boost their comprehension level. This leads us to say that the low level of the students in GE is a major barrier that indeed prevents them from reading in scientific literature. Consequently, the English course should be reconsidered to include both GE and EST in order to provide the students with a comprehensive content that suits scientific students' needs.

On the light of our findings, we recommend the following:

- Science students should be given an English course, a GE course per se, which tackles their potential problems before hand in order to make them sensitive in the learning process.
- Besides, teaching reading comprehension does not mean explaining a certain passage, but it should in fact train students to how to utilize the text in order to understand. In order words, how to be able to identify certain linguistic clues like cohesive ties that can help them in turn to understand the meaning of the text.
- In addition to this, students may think that during reading they should develop pronunciation, vocabulary, and grammar; instead, what they should develop is actually how to skim and scan a text and how to benefit from the linguistic context of what to read so that they get the meaning out from the print.

- Finally, we recommend to reconsider including both GE and EST in the English course and to focus a little bit on teaching cohesion.

In conclusion, we hope that our observations will be the starting point to raise some awareness about the situation of English in the department of physics. Subsequently, this implies looking forward to other ways of amending the situation of reading comprehension in this department, and in similar departments in other universities.

Bibliography

Balfakeh, Suad A. D. (2009). Problems in reading comprehension skills among secondary school students in Yemen. *Language in India, 9*, 275-283.

Carrell, P., Davine, J., & Eskey, D. (Eds.). (1988). *Interactive Approaches to Second Language*. Cambridge: Cambridge University Press.

Chapman, L. John (1987). *Reading: From 5-11 years*. Milton Keynes, England: Open University Press.

Demel, M.C. (1990). The relationship between overall reading comprehension and comprehension of coreferential ties for second language readers of English. *TESOL Quarterly, 24*, 2.

Foss, D., & Hakes, D. (1978). *Psycholinguistics: An introduction to the psychology of language.* Englewood Cliffs, UK: Prentice-Hall, Inc.

Goodman, K.S. (1971). Psycholinguistic universals in the reading process. In P. Pimsler, & T. Quinn (Eds.), *The psychology of second language learning* (P.135). Cambridge: Cambridge University Press.

Halliday, M.A.K., & Hasan, Ruqaiya (1976). *Cohesion in English*. London: Longman.

Harr-Augustein, S., Smith, M., & Thomas, L. (1982). *Reading to learn*. Methuen.

Hutchinson, T., & Waters, A. (1987). *English for specific purposes: A learning centered approach*. Cambridge: Cambridge University Press.

Irwin, Judith (1986). Cohesion and comprehension: A research review. *International Reading Association: DE*, 31-43.

Johns, T., & Davies, F. (1983). Text as a vehicle for information: The classroom use of written texts in teaching a foreign language. *Reading in a Foreign Language*, 1.

Johns, T. F., & Duddley-Evans, T. (1991). English for specific purposes: International in scope; specific in purpose. *TESOL Quarterly, 25*, 297.

Kendeou, Panayiota, & Van Broek, Paul (2007). The effects of prior knowledge and text structure on comprehension processes during reading of scientific texts. *Memory and Cognition, 35*(7), 1567-1577.

Kennedy, C., & Bolitho, R. (1984). *English for specific purposes*. Hong Kong: Macmillan.

Kurodo, M. (2003). An awareness of language as a multistratal system in EST writing. *English Usage and Style*, 20.

Lightman, Erin J., McCarthy, Philip M., Dufty, D.F., & McNamara, D.S. (2007). Cohesion and structural organisation in high school texts. *American Association for Artificial Intelligence*. USA: Memphis University. Retrieved Dec., 2009, from http: // www. aaai. org.

Mackay, R, & Mountford, A. J. (1978). *English for specific purposes: A case approach*. London: Longman.

McCarthy, Michael (1991). *Discourse analysis for language teachers.* Cambridge: Cambridge University Press.

McConkie et al. (1973). Experimental manipulation of reading strategies. *Journal of Educational Psychology, 65*, 1-8.

McDonough, J. (1984). *ESP in perspective: A practical guide*. London & Glasgow: Collins ELT.

McNamara, Danielle S., Best, Rachel, & Castellano, Corina (2003). Learning from text: Facilitating and enhancing comprehension. *Speech Pathology*. Retrieved January 3, 2010, from http: //www. Speechpathology.com/article-detail.asp? article-id=45.

Nuttal, C. (1982). *Language teaching methodology, textbook for teachers.* UK: Prentice-Hall International Ltd.

Oxford University (1986). *Reading and thinking in English: Discovering discourse.* UK: Cambridge University Press.

Ozuru, Yasuhiro, Dempsey, Kyle, & McNamara, Danielle S. (2009). Prior knowledge, reading skills, and text cohesion in the comprehension of science texts. In Anastasia Efklides (Ed.), *Learning and Instruction, 19*(3), 228-242.

Perason, P.D., & Johnson (1978). *Teaching reading comprehension*. New York: Holt, Rinehart & Winston.

Pugh, A.K., & Ulijn, J.M. (1984). *Reading for professional purposes: Studies and practices in native and foreign languages*. London: Heinman Educational Books.

Ramakanta, Sahu (2009). English for special purposes, English for science and technology. *Yemen Times, 1333.* Retrieved January 28, 2010, from http://www.yementimes.com/DefautDET. aspx?! =8308p=education&a=2.

Smith, F. (1982). *Understanding reading: Psycholinguistic analysis of reading and learning to read* (3rd ed.). New York: Holt, Rinehart & Winston.

Trimble, Louis (1985). *English for science and technology: A discourse approach*. Cambridge: Cambridge University Press.

Walsh, D. (1982). Reading scientific texts in English. *English Teaching Forum, 10*(3), 24-28.

Weise, G. (1979). A communicative functional approach to discourse analysis-based on a study of scientific texts. In G. Grinstein et al. (Eds.), *Trends in English, Text Linguistics: Linguistic Studies* (p.55). Birmingham, UK: Aston University.

Widdowson, H.G. (1974). An approach to the teaching of scientific English discourse. *RELC Journal*, 5.

Widdowson, H.G. (1979). *Explorations in applied linguistics*. London: London University Press.

Widdowson, H.G. (1983). *Learning purpose and language use*. Oxford: Oxford University Press.

Widdowson, H.G. (1984). *Explorations in applied linguistics* (2nd ed.). London: Oxford University Press.

Widdowson, H.G. (2006). *Discourse analysis*. Oxford: Oxford University Press.

Widdowson, H.G. (2009). *Teaching language as communication*. Oxford: Oxford University Press.

Wiggen, B.M. (1977). Syntax and discourse analysis: An approach to the teaching of scientific English discourse. *RELC Journal, 5*, 4.

Witte, Stephen P., & Lester Faigley (1981). Coherence, cohesion, and writing quality. *JSTOR: College Composition and Communication, 32*(2), 189-204.

Wright, A. (1987). *How to improve your mind*. Cambridge: Cambridge University Press.

Yorkey, Richards C. (1970). *Study skills for students of English as a second language*. USA: McGraw-Hill.

Yule, George (2006). *The study of language* (3rd ed.). Cambridge: Cambridge University Press.

APPENDICES

Appendix 1

Mentouri University-Constantine.

Department of Languages.

Students' Questionnaire

*Please put **(x)** in the correspondent box*.

1. Are you motivated towards learning English?

yes ☐ no ☐

2. Do you consider English as important as the other modules?

yes ☐ no ☐

3. In general, what is your performance in English?

good ☐ average ☐ bad/low ☐

4. Do you read in English?

yes ☐ no ☐

5. If yes, how often do you read?

frequently ☐ sometimes ☐ rarely ☐

6. If you read, what kind of documents do you usually read?

(1) textbooks that have to do with your field of study ☐

(2) texts or articles given by your teachers ☐ (3) online articles (from Internet) ☐

7. If you answered (1) above, is it because you need to

be able to get information not available in Arabic or French ☐ write scientific reports ☐

pass examination (answer exam questions) ☐ prepare your dissertation ☐

8. Do you have problems in understanding what you read?

often ☐ sometimes ☐ rarely ☐ never ☐

9. If you have problems in understanding, is it because:

you do not know enough the English language ☐

you don't have sufficient knowledge in your field of study ☐

you ignore the organization of texts in science ☐

you are unable to understand the scientific language : terminology, interpreting graphs… ☐

10. Or, do you have difficulties exactly with:

general vocabulary ☐ scientific terminology ☐ sentence structure of scientific writing ☐

elements linking sentences (cohesive ties) ☐

11. What do you usually do when you face such problems?

try to understand by reading more than once ☐ relate each sentence to previous ones ☐

guess the general idea from the title or the words you know. ☐

rely on connectors that bind sentences together like pronouns and conjunction ☐

12. Do you know the English cohesive ties?

yes ☐ no ☐

13. Do you know that these cohesive ties help you understand when you read?

yes ☐ no ☐

14. As a science learner, what do you want to learn English for?

terminology ☐ the structure of texts ☐ grammar & vocabulary ☐

Thank you for your collaboration

Appendix 2

The Reading Comprehension Test: Task One
What Is Physics?

Physics is the use of the scientific method to find the basic principles governing light **and** matter, **and** to discover the implications of **those** laws. Part of what distinguishes the modern outlook from the ancient mind-set is the assumption **that** there are rules **by which** the universe functions, **and that** those laws can be at least partically understood by humans. From the Age of Reason through the nineteenth century, many scientists began to be convinced **that** the laws of nature **not only** could be known **but**, as claimed by Laplace, those laws could in principle be used to predict everything about the universe's future **if** complete information was available about the present state of all light **and** matter.

Matter can be defined as anything **that** is affected by gravity, i.e., **that** has weight **or** would have weight **if it** was near the Earth **or** another star or planet massive enough to produce measurable gravity. Light can be defined as anything **that** can travel from one place to another through empty space **and** can influence matter, **but** has no weight. For example, sunlight can influence **your** body by heating **it or** by damaging your DNA **and** giving your skin cancer. The physicist's definition of light includes a variety of phenomena **that** are not visible to the eye, including radio waves, microwaves, x-rays, **and** gamma rays. There are the "colors" of light **that** do not happen to fall within the narrow violet-to-red of the rainbow **that** we can see.

Many physical phenomena are not **themselves** light **or** matter, **but** are properties of light **or** matter **or** interactions between light **and** matter. For instance, motion is a property of all light **and** some matter, **but it** is not **itself** light **or** matter. The pressure **that** keeps a bicycle tire blown up is an interaction between the air **and** the tire. Pressure is not a form of matter in **and** of **itself**. **It** is as much as a property of the tire as of the air. **Analogously**, sisterhood **and** employment are relationships among people **but** are not people **themselves**.

*(From **Newtonian Physics** by Benjamin Crowell, pp. 22-23).*

Remark:

Pronouns (indicating reference).

Conjunctions (coordinating and subordinating).

Section One:

1. What do the pronouns refer to in the text?

pronoun	referent
Those	
It	
Your	
It	
Themselves	
It	
Itself	
Itself	
It	
Themselves	

2. What is the function of each conjunction in the text?

conjunction	function
	Connecting equal similar ideas.
	Connecting two equal choices.
	Connecting equal different ideas.
	Referring to things or animals (inanimate).
	Condition (under what condition).
	Expressing analogy.

Section Two: Comprehension Questions

1. What is the distinction between the modern thinking and the ancient belief about physical phenomena?
2. When did the scientists' conviction begin to emerge?
3. Which name is used to describe things with weight and can be influenced by gravity?
4. Which label is used to refer to weightless things that are capable of moving through vacuum from one place to another and can affect the 'thing' in the 3rd question?
5. How can light from the sun affect humans' skin?
6. Name the invisible phenomena that are mentioned in the physicist's definition of light?
7. In the text, what is the physical phenomenon that is neither light nor matter but it is a characteristic of both of them?

Appendix 3

The Reading Comprehension Test: Task Two

Atoms: Atomism

If atoms did exist, what types of atoms were there; what distinguished the different types from each other? Was it the size, the shape, the weight, **or** some other quality?

The big difference in attitude between the ancient **and** modern atomisms becomes evident **when** **we** consider the wild speculations **that** exist on **these** issues until the present century. The ancients decided that there were four types of atoms, earth, water, air **and** fire; the most popular view distinguished **them** by the "shape". Water atoms were spherical, **hence** water's ability to flow smoothly. Fire atoms had sharp points, **which** was why fire hurt **when** **it** touched one's skin. (There was no concept of temperature until thousands of years later.) The drastically different modern understanding of the structure of atoms was achieved in the course of the revolutionary decade stretching 1895 to 1905.

How would one find out what types of atoms there were? Today, it doesn't seem impossible to work out an experimental program to classify the types of atoms. The atom is the basic unit of one of the chemical elements. For each type of atoms, there should be a corresponding element, i.e., a pure substance made out of nothing **but** only of **that** type of the atom. Atoms are supposed to be unsplittable, a substance like milk could not possibly be an *element, **since** churning **it** vigorously causes it to split up into separate substances: butter **and** whey. Rust could not be an *element, **because** **it** can be made by combining two substances: iron and oxygen.

*(Adapted from **Electricity and Magnetism** by Benjamin Crowell, pp.20-21, 23.)*

Remark:

Pronouns (indicating reference).

Conjunctions (coordinating and subordinating).

NB: *Elements: are any of certain *simple* substances that, alone or in combination, make up all substances: *hydrogen and oxygen are elements, but water, which is formed when they combine, is not.*

Section One

1. What do the pronouns refer to in the text?

pronoun	referent
We	
These	
Them	
It	
It	
It	

2. What is the function of each conjunction in the text?

conjunction	function
	Condition (under what condition).
	Connecting two equal choices.
	Connecting equal similar ideas.
	Expressing time.
	Referring to things or animals (inanimate).
	Expressing result.
	Connecting equal different ideas.
	Expressing reason (why?).

Section Two: Comprehension Questions

1. When did the difference between atomisms in the past and in the present day become clear to be understood?
2. How many types of atoms were there in the past?
3. On what basis did the ancients distinguish these types?
4. During which did the different modern revolutionary understanding of atoms' structure begin to emerge?
5. On what basis did the modern atomism classify the different types of atoms?
6. Why 'milk' and 'rust' cannot be considered as 'elements'?

Appendix 4

The Reading Comprehension Test: Task Three
Work: the Transfer of Mechanical Energy, the Concept of Work

A conserved quantity is any mass **that** is contained in a closed system. **If** the system is not closed, there are some ways of measuring the amount of mass **that** goes in **or** out like, for example, the way of measuring used by the water company. **It** uses a meter **that** records people's water use.

When the system is not closed, we would like to know how much energy comes in **and** out. Energy, **however**, is not a physical substance like water, **that's why** energy transfer cannot be measured with the same kind of meter used with water. How we can tell, for instance, how much useful energy a tractor can "put out" on one tank of gas?

The law of conservation of energy guarantees **that** all the chemical energy in the gasoline will reappear in some form. **This** form is not necessarily useful **or** doing farm work. Tractors, like cars, are extremely inefficient **because** 90% of the energy **they** consume is converted directly into heat, **which** is carried away by the exhaust **and** the air flowing over the radiator. **Hence**, **we** can distinguish the energy converted into harmful heat from energy **which** serves to accelerate a trailer **or** to plow a field. **We, consequently**, define a technical meaning of the ordinary word "work" to express the distinction: "work is the amount of energy transferred into **or** out of a system, without counting heat transferred by heat conduction".

The conduction of heat should be distinguished from heating by friction **for** the following reason. **When** a hot potato heats up **your** hands by conduction, the energy transfer occurs without any force. **In contrast, when** friction heats your car's brake shoes, the energy transfer occurs with force. This force can be measured by completely different methods, **so** heat transfer by frictional heating should be included under the definition of work, **but not** heat transfer by conduction. The definition of work could **thus** be restated as the amount of energy transferred by forces.

*(Adapted from **Conservation Laws** by Benjamin Crowell, pp. 49-50).*

Remark:

Pronouns (indicating reference).

Conjunctions (coordinating and subordinating).

Section One:

1. What do the pronouns refer to in the text?

pronoun	referent
It	
We	
This	
They	
We	
Your	

2. What is the function of each conjunction in the text?

conjunction	function
	Referring to animals or things (inanimate).
	Condition (under which condition).
	Connecting a result to a reason.
	Referring to a time.
	Connecting equal similar ideas.
	Contrasting.
	Expressing result.
	Expressing reason.
	Connecting equal different ideas.
	Connecting a reason to a result.

Section Two: Comprehension Questions

1. In terms of conservation of quantity, what is the difference between the amount of mass in the closed system and in the non-closed system?
2. How does the water company measure the amount of the consumed water?
3. Why energy cannot be measured by using the kind of meter used with water?
4. Which of the physical laws can explain the reappearance of energy in another form?
5. Which form of energy is harmful for tractors or cars?
6. What is the kind of heat that is excluded from the definition of "work"?
7. What is the difference between heat transferred by conduction and heat transferred by friction?
8. Which kind of heat is added to the definition of "work"?