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Specificities of Scientific Texts' Reading in the Secondary School

The Case of Third Secondary School Students in Mediouna Lycée/Relizane

A Dissertation Submitted as a Partial Fulfilment for the Degree of Magister in ESP
(English for Specific Purposes)

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Dedication

I dedicate this work to the soul of my father , may Allah bless him , to my tender mother , to my patient wife and to my dear crystals Asmaa , Ikram and Salah Eddine.

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Last but not least, I must thank my dear wife for her patience and for her relentless encouragement to complete this work.

Abstract

Most secondary school EFL teachers in Algeria claim that their students encounter real difficulties to understand scientific texts inserted in their English textbook. This study has attempted to investigate the major factors that influence the scientific texts' reading task and hinder the third year secondary school students' ability to understand such type of texts. These factors incorporate mainly some English scientific text features, actual psychological handicaps that prevent students from having an easy access to scientific texts comprehension and major current teaching methods and conceptions as being applied by the English teacher with English scientific texts. To fulfil this aim, this research work approaches a systematic analysis based on theory and practice arranged into four chapters.

Chapter one provides a description of the current learning situation of the target group of students and some of its related issues. Besides, it incorporates a brief explanation of the research tools used in the methodology of the thesis.

Chapter two is dedicated to shed light on the major concepts related to English for Specific Purposes' discourse and to the reading comprehension task of general English as a whole. This chapter ends up with the presentation of some specificities characterising reading English scientific texts which create problems and difficulties for secondary school students in particular.

Chapter three represents the field work of the study. It includes the data analysis of the research tools which incorporate two different questionnaires addressed to the teachers and to the students respectively and an observation sheet.

Chapter four is devoted to suggest some of the reading strategies that could help the "terminale" students overcome the problems they usually encounter when they read English scientific texts. Such strategies, of course, are the outcome of some prominent studies carried out by specialists in the field of EST teaching. The aim of incorporating such reading strategies is to facilitate the reading task of the English scientific texts to the EFL learners in general and to the secondary school students in particular.

List of Acronyms

BA	Bachelor of Art
CBA	Competency Based Approach
CBLT	Competency Based Language Teaching
EAP	English for Academic Purposes
EBE	English for Business and Economics
EFL	English as a Foreign Language
ELL	English Language Learners
ELT	English Language Teaching
EOP	English for Occupational Purposes
ESS	English for Social Studies
ESL	English as a Second Language
EST	English for Science and Technology
ESP	English for Specific Purposes
GE	General English
GPE	General Purposes English
MCQ	Multiple Choice Questions
NNS	Non-Native Speakers
SE3	Third Year Secondary Education

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General Introduction

Reading is an essential skill for learning English as a foreign language. For secondary school students, reading is an important skill that they need to master in order to understand the selected texts in their English textbooks. Secondary students have also to manage the reading comprehension skill in order to do well in their school exams. Thus, reading is a very significant skill in the process of the foreign language learning in general.

However, the teaching experience has shown that students in the Algerian secondary school still face some difficulties to gain full control over the reading comprehension skill. One can notice this fact through a simple look at the students' reading assessment grades which are still low and unsatisfactory. This is the situation for reading texts that carry general aspects (non –specialised texts) .The situation would seem more serious if we want to talk about reading more specialised texts such as reading English scientific texts which will be our focus in this dissertation.

In fact, secondary school students still find real difficulties to understand English scientific texts and to do reading comprehension activities and tasks related to that field of topics. They often also feel anxious while being confronted with scientific texts and claim to have a “mental block” against understanding texts written in scientific language. Moreover, teachers in the secondary school can plainly notice that although there is a clear difference between literary and scientific texts in terms of language usage (selected vocabulary, structure of sentences and style) and objectives of the discourse, the selected types of the different reading comprehension tasks and activities are much more similar (reference or inference questions, true or false statements, multiple choice questions, table completion, ect..).

For such a research statement, the following research questions are suggested:

- What are the factors that make the scientific English texts' reading comprehension a difficult task for the “terminale” students?

- Why do the 3rd year secondary students feel anxious while being confronted to scientific texts?
- What types of reading strategies are more adequate with scientific English texts?

The suggested research questions have led us to the following hypotheses:

The difficulty that the students find to deal with scientific texts may be owed to some specific linguistic features of scientific texts in general. Moreover, Learners feel anxious while being confronted to scientific texts because of the particular features of the scientific English discourse. Furthermore, the task of scientific English texts' reading may be facilitated through the selection of more adequate reading strategies to such kind of texts.

Our main concern through this dissertation is to achieve the following aims:

- To highlight some of the most common factors related to the teaching – learning situation that hinder the students 'ability to read English scientific texts.
- to depict some of the major linguistic features that specify reading English scientific texts in the secondary” terminale” level and that restrain the students ' reading comprehension ability of such kinds of texts.
- To seek some effective reading strategies that would simplify reading scientific texts for secondary school students.

To achieve such aims, two types of data gathering tools will be used: a questionnaire and an observation sheet.

One questionnaire will be targeted at the teachers of 3rd year scientific stream students with the aim of discovering the major difficulties that they and their students face while dealing with the reading comprehension of English scientific texts. Besides, it will handle issues that would facilitate the reading comprehension of such type of

texts. Another different questionnaire will be administered to the third year scientific branch students. In this questionnaire, the focus will be also on the most prominent obstacles that prevent students from understanding English scientific texts.

Concerning the observation sheet, the researcher will attend a reading session of an English scientific text with the previously mentioned group of students and will observe and take notes of the current behaviour of the target group of students during the reading session.

It should be mentioned that all these tools are to be administered in one setting which is the Secondary School of Mohamed BOUDIAF in Mediouna where the researcher is still a teacher at the current time.

The importance of the study lies in the fact that it presents a step that would attempt to identify the main difficulties encountered by students in reading English scientific texts, with the aim of course of seeking or suggesting ways making the task less difficult. Because reading is very significant in the process of foreign language learning, the research will help to a more adequate learning of the English language and more precisely to ESP (English for Specific Purposes) learning since scientific English is a branch of ESP field.

Chapter 01:

Learning Situation and Methodology of Research

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1.1-Introduction

Most teachers in the field of the English language teaching would agree with the fact that the level of the secondary school students in the English language learning in Algeria has terribly declined in the last few past years. As far as our research is concerned, it is to going to shed light on one of the most important skills for learning English where the third level students in the secondary school still encounter problems which is the reading comprehension skill, and more precisely the reading comprehension of scientific texts. Besides, there are other problems that that led to the deterioration of standards and caused an alarming situation of English teaching in Algeria. Some of these problems and obstacles will be discussed in the following chapter which will be devoted to give an idea about the English learning situation in Algeria's secondary school as a whole. The chapter will end up with brief presentation of the methodology and research tools that will be used in this thesis.

1.2-English Language Situation in Algeria

English seems to be the most frequently used language in every corner of the world. It is used in some places as a mother tongue, whereas in other parts of the globe as a second or a foreign language. With regard to the third world countries, it has been quickly spread thanks to the economic development and technological advancement. It becomes then the language of scientific research and the important means of communication between different continents of the world especially Africa.

With regard to Algeria, English is taught as a foreign language .As far as its linguistic map is concerned, Algeria enjoys a '*linguistic plurality (or diversity)*'. Besides the national language used in administration and the media which is Classical Arabic, Algerian Dialectal Arabic and Berber are spoken in everyday life and informal situations. For historical reasons, French stands as a second language that still occupy a prominent part in the Algerians' lives and culture.

Compared to Arabic and French language, Algerian school students meet English only in the classroom .Thus; they are deprived of a real contact with the

English language use in society. As Krashen (1985: 46) states, for such learners, “*the only input is teachers or classmates’ talk.*” Spolsky from his part also insists on the importance of social context to learn a foreign language when he states, “*Social factors have even more importance in the case of second language learner’s social context.*” The limited exposure to the target language and lack of opportunities to practise speaking in such environments present a handicap for students to develop their communicative abilities and practise their language skills acquired in the classroom.

1-3-Aims and Objectives of English Language Teaching in Algeria

For many years now, English has been referred to as a global language, as a language of communication and technology. Everybody seems to be learning English. English is being used in education, at work and especially in the world of technological advances. Because of this growing importance, English has become an obligatory subject on every school curriculum throughout the world. Today, around two billion people speak English as their second language. That is about a third of the world’s population speak English as their second language.

Algeria, which is part of the African continent, has given opportunities to its students to study for higher levels and to make researches in different fields such as science and technology. The Algerian system of education has given great importance to the foreign languages and has encouraged their use, especially English which has benefited from The Algerian economic interests in the field of petroleum and natural gas. Such interests were to orientate the country to the west English speaking like the United States of America and the United Kingdom. However, this specific economic interest involves the teaching of a new approach of English which is ESP. According to Dudley-Evans and St. John(1998), in terms of absolute characteristics, ESP is likely to be designed for adult learners, either at a tertiary level institution or in a professional work situation, and could also be for learners at secondary school level. Thus, the Algerian pedagogic authorities tried to work on this issue through the introduction of syllabuses that are to incorporate extracts of scientific reading topics which we are going to illustrate by mentioning some whole scientific units inserted in the third year

English textbook .However, we still need to evaluate to what extent are our secondary school learners able and ready to grasp those “snapshots” of ESP texts.

Moreover, the Algerian students have shown a great interest to study English after they realised its importance in modern world as being spoken worldwide and also it gained such an interest over the competing French language where the students ‘ results have been disappointing. From its part, the Algerian Ministry of education has set some major objectives of teaching and learning English in Algeria. It affirms (2005 :4):

*“ Teaching English in Algeria aims at setting up and developing communicative, linguistic, cultural and methodological competencies that would permit to the learner to face situations of oral or written communication that have to take into consideration his or her future needs and those of the society in which he or she evolves.”*¹

In accordance with those expressed aims of English language teaching aims in Algeria, three main objectives can be distinguished:

1-3-1 -Linguistic and Communicative Objectives

- To consolidate and develop the basic knowledge acquired in the intermediate school to help the learners carry on with their learning of the English language.

- To keep them equipped with the necessary tools to pursue their general training.

1-3-2 -Methodological Objectives

- To consolidate and develop the strategies of learning and of self evaluation that the learners have already acquired in the intermediate school.

- Reinforce and strengthen the study skills and techniques of what has already been acquired.

1-« *l’enseignement de la langue anglaise se propose d’asseoir et de développer des compétences d’ordre communicatif, linguistique, culturel et méthodologique qui permettront a l’apprenant de faire face a des situations de communication orale et / ou écrite compte tenu de ses besoins futurs et de ceux de la société dans laquelle il évolue. »*

1-3-3 -Cultural Objectives

-To make the learners know more about the various contexts of culture and civilisation of the English language and help them develop their minds to stimulate their response towards that culture.

- To place the learners in an environment which suits their needs and interests in conceiving and planning activities in real-life situations.

These were in brief some of the major objectives of English language teaching in the Algerian secondary school for which important languages teaching approaches have been set.

1-4-Approaches to English Language Teaching in Algeria

In the recent years, there has been much discussion about teaching English in secondary school in Algeria. Since independence, at least three main approaches have been applied to English language teaching in Algeria with the aim to evolve the level of the English learning among Algerian students: the structural approach, the communicative approach and the current CBA approach that refers to the Competency Based Approach. The succession of these approaches proves that the educational board in Algeria are still implementing on the most appropriate teaching strategies that would evolve the level of English among Algerian students. Let us first shed light on the most particular features that characterise each of those prominent approaches.

1-4-1-Definition of an Approach

According to Anthony (1965:94),

“An approach is a set of correlative assumptions dealing with the nature of language teaching and learning. An approach is axiomatic .It describes the nature of the subject matter to be taught .It states a point of view , a philosophy ,an article of faith-something which one believes but cannot necessarily prove. It is often unarguable except in terms of the effectiveness of the method it grows out of it.”

1-4-2-The Structuralist Approach

After years of dominating the Algerian school English teaching syllabi, the structural approach proved to carry some remarkable drawbacks that had some effect on the process of English learning among Algerian students. One of its main drawbacks is that it focused on language usage rather than on the language use. This means that students were taught only grammatical forms. Such a fact led our students later on to find difficulties in dealing with language when trying to convey their own ideas into communicative situations. In other words, students fail to put into practice (use) what has been learnt (usage). Widdowson (1978) states that the problem which is faced is that students, who have learnt many years of structural or formal English teaching, remain weak to possess the ability to use it and understand its use in normal communication. The weak point of the structural learning process is in the fact that it bases on the acquisition of forms rather than functions. Under such an approach, learners, thus, are unable to communicate their ideas in the different social situation they get involved in. Therefore, there was a need to look for an approach that could enable the students to transmit the target language into real use .Hence; the Notional /Functional approach was introduced in order to fulfil such an aim.

1-4-3-The Functional –Communicative Approach

Under such an approach, the objective was to enable the learner to communicate successfully in wide range of situations. Thus, the learner is equipped with a range of notions in the foreign language such as : time , space, quantity ,location ,travel ,education ,size , colour , age, ect...that are expressed through communicative functions. A function is seen how to use a language in order to achieve a particular purpose, for instance: expressing likes, dislikes, preferences, agreeing and disagreeing , inviting, making suggestions , apologising , ect... .While describing this approach, Wilkins (1978:38) points out that it is potentially superior to the grammatical syllabus because it will produce a communicative competence and because its evident concern with the use of language will sustain the motivation of the learner. It is superior to the situational syllabus because it can ensure that the most important grammatical forms are included and because it can cover all kinds of

language functions, not only that typically occur in certain situations. Under such an approach, the teacher is regarded as a facilitator and not just an instructor. However, the communicative approach carries some weak points, too. Although it involves the ability to know the rules of grammar and to use appropriately in the different social circumstances, the focus is on the transmission of the meaning rather than the form used. Besides, it did really not permit for an easy evaluation of communicative tasks since one language function may carry different forms. Spolsky (1989) asserts this fact when he states, “*Speech act theory has made clear how many different structures can be used for the same act*”. More importantly, it is quite possible for the learner to know the immediate application of the language but cannot easily create language to suit his needs in different situations.

1-4-4-The Competency Based Approach

To answer such needs the Algerian Ministry of Education has recently adopted a new approach of ELT in Algerian secondary schools which is the Competency Based Approach or what is simply referred as C.B.A. This new approach tends to make the learning skills related to the outside environment. It tends to put students in real world tasks. Thus, the syllabus designer’s main role is to help students, via teachers, to transfer the acquired knowledge in classroom into the real world beyond classroom doors. It has been developed and applied in the United States in 1980. Because of its success; it has been adopted in many ESL program worldwide schools. In Algeria it has been introduced by the Algerian Ministry of Education in 2005 and has been adopted in the new course books and program of English to develop intellectual competencies among the learner. As it has already been mentioned, a key concept of this approach is competency. Docking (1994:16) asserts this fact when he says,

“CBLT competency-based language teaching is designed not around the notion of subject knowledge but around the notion of competency. The focus moves from what students know about language to what they can do with it. The focus on competencies or learning outcomes underpins the curriculum framework and syllabus specification, teaching strategies and assessment.”

Under this approach, learning is mainly achieved through acquiring competencies that would develop a know –how to act among the learners by means of different functions and skills. Being a qualified language learner means simply to be a competent language user in real life situations. This involves the acquisition of learning strategies that enable learners to share and exchange knowledge with others and know how to co-operate with them.

Because it is still under experiment and test in the Algerian secondary school, it seems too early to evaluate the efficiency and the usefulness of the Competency Based Approach .However, this does not prohibit that some educators claim that the C.B.A is a “colossal” approach that needs an extensive preparation in the field of EFL teaching. According to them, many obstacles and real fact teaching problems stand in the path of the C.B.A. success in Algeria. Thus, it is preferable to tell about some of the problems that face the English language teaching in Algeria.

1-5-Problems of Teaching English in Algeria

The points discussed earlier seem too theoretical .However, in practice; the English language teaching in the most Algerian secondary school is facing many difficulties. The following section will be devoted to discuss some of these difficulties that have made the English language teaching in Algeria unsuccessful and that have contributed in the deterioration of the English language learning in most of the Algerian secondary schools.

1-5-1-The Neglect of the Teacher in the Decision-making

All educational theoreticians agree on the role of the teacher as being the most important member of the educational unity. He or she is the only one supposed to apply and put into practice all previously planned teaching theories and approaches with his or her students. The teacher is also supposed to be aware of all hazardous obstacles that may occur in the achievement of the different teaching theories when being practised in classrooms.Besides,he or she is aware of “ individual differences” between learners even in the same classroom. Thus, the teacher needs much freedom

to decide upon which learning theories and strategies are suitable for each class he or she is working with. However, this is not the case for teachers in Algeria as far as the Algerian schools are concerned. The teachers' views are simply neglected by the highly-centralised decision –making in Algeria and this is one of the problems of the centralisation which often does not take into consideration the specialists' views.

1-5-2-Teaching Aims and Learners' Needs

Learners come to the classroom without having an idea of what they are going to learn and often leave it without knowing what the purpose of what they have learnt is. In fact, they come to the classrooms to receive extracts of knowledge, memorise them and give them back in exams to pass to the next year. On the other hand, teachers do not identify really what their students want to learn. Indeed, it is time that an important stage in the ESP needs to be applied in teaching adult learners. This stage is known as “*Needs Analysis*». Hutchinson and Waters (1987:53) define ESP as being an approach to course design which starts with the question “Why do these learners need to learn English?” They state,

“All courses are based on a perceived need of some sort. Otherwise why English would find its way on to school or college timetable: someone at some time must have decided there was a need for it.”

Hence, teachers and learners should agree that the success of an English course should start first from a common need and interest of attending an English class. It is this shared need that should gear the English language teaching courses.

1-5-3- Teacher's Training

Although each time there is a new approach that comes to be applied in the EFL teaching, teachers have never been trained on the different approaches they are supposed to practise in their classrooms. Observation shows that many Algerian English teachers teach just the same way they were taught. The question that needs to be raised is do Algerian teachers understand the current approach they are dealing with? The success of any approach depends so much on understanding its major

components by its first practitioners who are supposed to be the EFL teachers in this case. In a study done in Greece, Karavas-Doukas (1996), reported that the communicative approach failed partly because teachers did not work in an adequate manner with its principles. They misunderstood the nature of communicative language teaching. Thus, she found that even when using textbooks designed for communicative activities, teachers tended to revert to traditional teacher-centered routines. Obviously we cannot expect from a teacher who received no training about the practised approach to understand an approach relying on his or her teaching experiences alone and, thus, to achieve the goals set by teaching such an approach or any other language theory in the end.

1-5-4- Large Classes

The Algerian secondary school classroom is generally made up of 30 to 45 pupils. This big number of students in one class makes it overcrowded and leads teachers work in a chaotic state. Instead of concentrating on the achievement of their lessons objectives, teachers lose much of their time and effort to calm down the students. This situation also does not allow the teacher to work with students as individuals (each one with different attitudes, capacities and motivation) but rather as a mass of brains which must acquire whatever teaching task they are involved in. J.Harmer (1998) clarifies this fact when he states,

“In big classes, it is difficult for the teacher to make contact with the students at the back and it is difficult for the students to ask and receive individual attention.”

Moreover, the fact of having a great number of pupils in small classrooms will hinder the possibility of working in groups. Experience shows that if the teacher tries to divide his class into small groups, he will devote more energy to control the process. Yet, this activity will not take place.

The problem of large classes is widening in Algerian secondary schools and is creating discipline problems among learners and demanding more efforts from the

teacher to control the situation .This fact is having a negative influence on the teaching-learning process as a whole.

1-5-5-Concentration on Marks

Another drawback which is having a direct negative impact on the English language learning in the Algerian secondary school is the concentration on marks. A teacher's target aim is to prepare his or her students for the examination scheduled at the end of each school term. In reality, students care only about their final success in the examination and the teacher's sole problem is to see that the pass percentage does not go down. According to Travis and Wade (1997:232), this is among the factors that decrease the learner's intrinsic motivation:

"The fact that our school system relies heavily on grades may help explain why the average college graduate reads few books. Like all extrinsic rewards, grades induce temporary compliance but not necessarily a lifelong disposition to learn"

The importance given to marks has many drawbacks:

1. It makes the learner concerned with exams and marks rather than the value he gets from what he is learning.
2. It decreases his curiosity and thirst to learn things apart from the syllabus.
3. It can urge the weak pupils to cheat in exams.
4. It transforms knowledge from a precious thing to be sought into numbers and scores.

1-5-6- Teaching Materials

Besides all the previously mentioned problems that hinder the success of the English language in Algeria, there is another fact which seems to worsen the situation. It is about the poor classroom conditions where English learning is taking place. This refers to the teaching materials which are still traditional and still confined to the board and the textbook. Moreover, the absence of the audio-visual aids which are supposed to facilitate language learning contribute as well in the loss of interest and motivation among the Algerian students to learn the English language. Visual aids are

incorporated to help clarifying meaning and make English learning easy for the students and as the famous saying goes one picture is worth one thousand words .With regard to the importance of the incorporation of visual aids in teaching , Marshall (2002) found strong evidence that educational technology complements what a great teacher does naturally, extends his reach and broadens students' experience beyond the classroom.Accordingly,Kumari and Rao (2004) confirm that the majority of educationists consider the use of instructional technology not only supportive but also effective for quality teaching learning process.

These were in short some of the main problems that are facing the English teaching in the Algerian secondary schools. It is evident such drawbacks are due to the contradiction that exists between theory and practice .However, these problems need to be carefully analysed by people supposed at the top of the educational sector in Algeria if really they want to evolve the level of the EFL among Algerian students. It is evident also that most points discussed were related to the teacher-learner relationship but sure there are other components that need to be discussed and highlighted. One important element of these components is the English textbook. Thus, the next discussion will shed light on the organisation of Third year English textbook.

1-6-General Presentation of the New English Textbook “New Prospects”

As far as the learning situation is concerned, it is necessary to provide some information about the third year English textbook. The aim is to shed light on the aims and objectives of the textbook as well as its design and organisation.

Level of proficiency: 3.A.S (3 year of secondary school).

The number of pages: 270 pages.

The textbook is basically designed for learners aged 17to 18, who have already four years/tuition in English at Middle School level and two years in the secondary school In the section *FOREWORD*, the author (S.A.Arab) explains that the textbook *New Prospects* came as an aftermath of the Competency based approach. It complies with the new English syllabus for SE3 as laid by the National Curriculum Committee of the

Ministry of National Education in March 2006. Three major features of this syllabus have been given careful consideration in designing the *New Prospects*' textbook:

- a)-The fact that the *Baccalaureate* is exclusively of the written mode.
- b)-The emphasis on a thematic orientation.
- c)-The need to cater for the pedagogical requirements of all *Baccalaureate* streams.

New Prospects contains six units dealing with the six main themes recommended in the syllabus with recurrent language functions, grammatical structures and language functions as well as skills and strategies. However, among the six units, every stream is expected to engage with only four mandatory units which shall cover aspects of the syllabus. Each unit provides teachers with texts which vary in purpose according to the general theme of each unit.

New Prospects is composed of:

- Contents
- Foreword
- Book Map
- 6 Units (pp 14-195)
- Scripts for listening (pp 196-210)
- Grammar Reference (pp 211-231)
- British and American English (pp 232-233)
- Spelling rules (pp 234-235)
- Phonetic Symbols (pp 236)
- Pronunciation rules for final –ed and –s (pp 237)
- Irregular verbs (pp 238)
- Resource Portfolio (pp 240-270)
- Acknowledgements

1-6-1-Unit Organisation

Since in our study we focused on the scientific class only, here are the four main units that are recommended for the scientific stream students:

Unit One: Ill Gotten Gains Never Prosper

Unit Two: Safety First

Unit Three: It's A Giant Leap for Mankind (Astronomy)

Unit Four: Keep Cool

The four units are supposed to be distributed on the basis of 81 teaching hours along the whole school year. Each unit comprises two main parts with two sequences each. The first part, *language outcomes*, is divided into *Listen and Consider* and *Read and Consider*. The purpose of these two sequences as the author explains in the *FOREWORD* page is to work on the language dimension of the texts by the study of grammatical structures, vocabulary, pronunciation and spelling with the aim to get the students internalise the thematic and linguistic “tools” they will make use of in the second part of the unit. Both sequences ,i.e. *Listen and consider* and *Read and consider* close with a rubric entitled *Think , pair , share* .The tasks of this rubric aim at getting the students to re-invest in speaking or writing the thematic and language elements acquired through the sequence by fulfilling a particular function (advising , comparing , informing , etc..).

The second part of the unit, entitled *Skills and Strategies Outcomes* is essentially concerned with the structural and discursive aspects of the texts. The main interest shift to be on the compositional skills and communication strategies .This part comprises two sequences Listening and speaking and *Reading and writing*. Both sequences focus on the practice of primary skills (listening, speaking, reading, writing) and social skills (collaborative work, peer assessment, responding to problem-solving situation ...).By closing with the *Saying it in writing* and *Writing development* rubrics, both sequences target to concretise ; as the author asserts , what is termed in the official syllabus as “ *the integration terminal objective.*”

Besides these major sequences, the unit comprises other parts which are *the Research and report* and *Project outcomes* assignments. At this stage, the students are asked to carry out a research on a particular topic related to the theme of the unit.

As to evaluation, the unit closes up with two kinds of assessment:

Language assessment which is a checklist of language items that the student has already learnt along the unit outcome and needs to check his or her level of mastery to them.

Skills and strategies assessment where the teacher is supposed to select suitable texts from the *Resource Portfolio* to check the students' progress in terms of skills and strategies.

As it is plainly noticed, our unit which is under scope is this study is unit three which is about astronomy because it is the most prominent unit one among the other units which comprises a purely scientific content. The unit does not differ in terms of sequences' organisation from the other units. However, the main difference should be in terms of language content. Since our focus will be just on the reading comprehension skill of English scientific texts, it is useful to supply an illustration of a reading lesson plan that exemplifies a part of the **READ AND CONSIDER** sequence of the third unit entitled “It's a Giant Leap for Mankind (astronomy).”

1-6-2--An Example of a Scientific Text Reading Lesson Plan

For the sake of knowing more about how current scientific text reading lessons are planned at the third year secondary school level, we would like to present an example of a lesson plan that is about a text entitled “The Solar System” and that belongs to unit three “Astronomy”. Here is the illustrative lesson plan of scientific text reading comprehension and its related text that is found in the third year English textbook on page 143.

SEQUENCE ONE: READ AND CONSIDER (p.142)

Passage: The Solar System, pp.143-144.

Objective: By the end of this lesson, pupils should identify the major components of our solar system.

Passage: The Solar System, pp.143-144.

A- Getting started: p .142

Aim: Introducing the pps to some major information about the solar system.

Act 1: Consider the nine historical planets below. Which one, do you think, is no longer considered as a planet? Why is it so?

<i>Pluto – Mercury- Earth- Mars- Saturn- Uranus - Venus – Jupiter - Neptune</i>

1) *Pluto* is no longer considered a planet. According to experts, it's just a member of an asteroid belt beyond Neptune, along with 12 newly discovered mini-worlds.

Act 2: How long does it take the Earth to make one complete revolution around the sun?

2) It takes the Earth *One year (365 and 1/4 days)* to make one complete revolution around the sun.

Act 3: What do you think are the similarities and differences between astronomy and astrology?

3) *Astronomy* is a science whereas *astrology* is a pseudo-science. The former studies the sun, the moon, stars and planets to get information about them whereas the latter observes them with the belief that their positions will tell about man's destiny.

B-Taking a closer look: p.142

Aim: Checking the pps' thorough understanding to the elements of the text.

Act 1: (Names of the Planets - Starting from bottom to left)

Read the text on pages 143-144. Then label the different heavenly bodies represented in the picture on the next page.

- 1) Sun ► 1. Mercury, 2. Venus, 3. Earth (Moon in the black box) , 4. Mars, 5. Jupiter, 6. Saturn 7. Uranus, 8. Neptune 9. Pluto is no longer considered a planet.

Act 2: (Comprehension Questions)

- 1-Read the text again the answer the following questions.
 A-What are the various heavenly bodies that constitute the solar system? Arrange them according to their size (from the smallest to the largest).
 B-In what way is the orbit of the moon different from those of the planets?
 C-Whose speed is 12 miles per second?
 D-What makes life possible on Earth?
 E-Why are the planets likened to huge mirrors?

Answers:

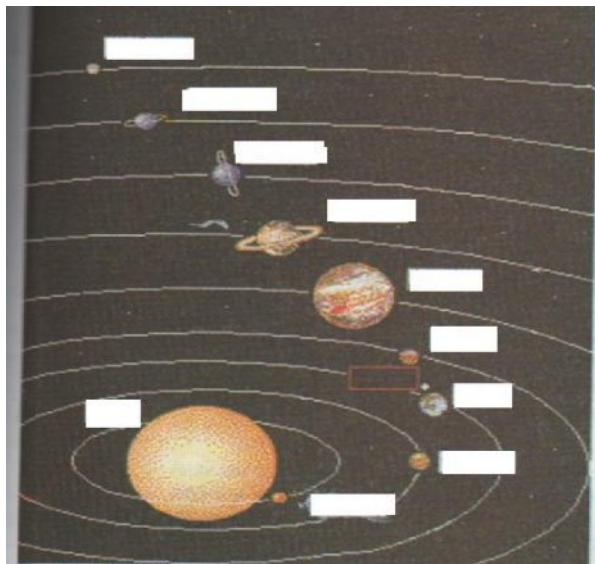
- A. The various heavenly bodies that constitute the solar system are : meteors- comets-asteroids satellites-moons- planets and stars .
 B. The moon orbits the earth whereas the planets orbit the sun.
 C. The heavenly bodies' speed is 12 miles per second.
 D. The heat energy and light energy make life possible on Earth.
 E. The planets are likened to huge mirrors because they reflect the light from the sun.

Act 3: (Converting temperatures from Fahrenheit into Celsius)

- 3)-Convert the Fahrenheit temperatures in the text into Celsius (or centigrade) temperatures using one of the following scales:

The Scales:

- | | |
|--|--|
| Celsius | Fahrenheit |
| $C = (F - 32) \times \frac{5}{9}$ | $F = (C \times \frac{9}{5}) + 32$ |
| 1) $10,000 - 32 \times \frac{5}{9} = \dots\dots\dots ^\circ C$ | 2) $27,000,000 - 32 \times \frac{5}{9} = \dots\dots\dots ^\circ F$ |



Picture 1.1: The Solar System

(the picture as illustrated in the English textbook)

The Target Text :

“ If you were out in space, billions of miles away from our planet, you would see the Earth as a tiny ball moving in a wide path around a star that you might recognize as our sun. You would also see, at various distances from the sun, seven other spherical bodies *of different* sizes - the other planets - all travelling in the same direction in almost circular paths around the sun. Moving around some of the planets are smaller balls - the satellites or moons of the planets. (§1)

Now suppose you were still in space and that you were looking at the space between the orbits of planets Mars and Jupiter, what would you see? There would be thousands of little planets, or asteroids, also revolving around the sun. Cutting in this way and that, across the paths of the planets, you would see comets - starry-headed objects, sometimes with long tails . Streaming after them as they draw near the sun, you might also catch a glimpse of swarms of even smaller particles -the meteors- swirling through space. (§2)

All these bodies make up our vast solar System. If you continued to view them for months or for years, you would see that they were moving together through space as a unit, at the rate of some twelve miles a second, in the general direction of the blue star Vega. (§3)

The sun is the very heart of our solar system. It is a typical star - one of the several thousand millions of stars in our galaxy; like the rest, it is--an incandescent body made up of highly compressed gases. Compared with the other stars, the sun is of average size, but it is a giant in comparison with even the largest planets. Its diameter of 865,600 miles is 109 times that of the Earth; even though it is gaseous, it weighs more than 300,000 times as much as the Earth. Its surface temperature is about 10,000 degrees Fahrenheit; at its centre the temperature may be as high as 27,000,000 degrees Fahrenheit. The heat energy and light energy radiating from the sun make it possible for life to exist upon earth. Without the reflection of the sun's light, we could not see the other members of the solar System except for the comets and meteors. (§4)

The sun is just one of the stars in our universe. When the skies are clear, we can see the twinkling of these other stars at night. Their light is less intense than that of the sun because they are far more remote from us than any other heavenly bodies. (§5)

We know that the planets of the solar system are different from the distant stars in some very important ways. Unlike stars, which shine with their own light, the planets give off no light of their own. All we can see is the light from the sun that

they reflect back to us as if they were huge mirrors in the sky. In addition, each one of the eight planets is travelling in its own special path or orbit around the sun held in place by the powerful force of the sun's gravity, very much as if it were a ball speeding around the sun in a matter of a few months. More distant planets have larger orbits and travel far more slowly. Jupiter, for example, takes more than eleven Earth years to make one complete turn around the sun while Earth makes its path around the sun in just 365 % days - in other words, once a year.

(From the *Book of Popular Science* and Alan E. Nourse, *The Giant planets*)

It can be noticed that there is no clear difference between a reading lesson plan meant for scientific texts and a reading lesson plan of other types of texts in terms of steps' organisation and the type of activities' choice. One should also mention that such kind of scientific texts are devised for third year science class in order first to raise their motivation to English learning and also allow them to use their previously acquired knowledge learnt within the different scientific disciplines. However, being confronted with this traditional kind of comprehension question, structure of exercise, and so on, the students lose much of their motivation and interest towards decoding the elements of the target text. Furthermore, with such type of questions, the focus is only on the reading product, that is to say, the main output of the reading passage. Yet, it is time to conceive the reading skill as a "process". In other words, the way the students' mind observes, organises and stores information of the reading passage. Moreover, the kind of the reading activities mentioned in the lesson plan above do not allow the students to interact with the target text in the sense that they seem unable to bring any of their previously acquired knowledge to the text's outcome.

Such drawbacks would encourage us to think again of the possibility to devise a reading lesson plan of English scientific texts that would comprise more genuine adequate activities and reading strategies. However, for the time being let us stick to the students' learning situation by giving more information about the target group of students meant for this study.

1-7- General Profile of the Target Students' Group

The following table would provide some major information of the target group of students that represents one group of the thesis 'informants. Some of the information was provided by the administration of Mohamed BOUDIAF Secondary School .This covers the students' averages and marks of the second school term of the year 2010.Concerning the teacher's experience and degree, these were obtained from the teacher of the target group .

The Name of the Secondary School	Mohamed BOUDIAF Secondary School
Its Location	In Mediouna(a small village in the north of Relizane)
The Students' Class	3rd year secondary school
Their Branch of Study	Scientific Stream
Their Number	27 students (17 girls and 10 boys)
The Age of the Students	Ranges between 18 and 19
The Number of Repetitive Students	10 students (07 girls and 03 boys)
The Students' Years of English Learning	6 years
The Number of English Teaching Hours per Week	3 hours
The Coefficient of English	2
The Number of School exams in a year	3 exams
The Class General 2ND Term Average	11.35
The Class 2nd Term Average in English	9.84
The Best Average in English during the Second Term	16.89
The lowest Average in English during the Second Term	6.00
The Rate of Success in English during the Second Term	42.86%
The Degree of the Group's teacher	B.A degree in English
The Teacher 's Experience	Permanent since 2004

Table 1.1: The Target Students' Profile

Contrary to what we have said previously about the serious overcrowding characterising the secondary school classes in Algeria, our target class seems much lighter in terms of students 'number. This fact should normally facilitate the teaching

task for the class teachers including the English teacher and should also provide a suitable learning atmosphere for the students as well. However, after attending a reading session with this class, there was an impression that at least a big number of students seem not really interested in what the teacher was doing and explaining. A fact which may be attributed to extrinsic factors such as: the low coefficient labeling English as a subject compared to the other scientific subjects or perhaps to the timing of the English hours of study which most of the time are placed in the afternoon when generally students' mental abilities seem unable to grasp or even follow the lesson points since at this time much of the students' energy will be already exploited by the previously taught scientific subjects.

1-8-Methodology

Concerning data collection, an observation sheet and two different questionnaires will be used. A detailed description of those research tools is provided in the third chapter of this research which represents the practical part of our study.

For the observation sheet, the researcher will attend a reading session of an English scientific text with the target group of students meant for this study to observe and take note what their real reading problems are. This observation sheet will take into consideration the type of activities suggested by the teacher during the reading session. The content of the English scientific text dealt with in the target reading session and its format will be also under focus.

Concerning the two different questionnaires, one questionnaire will be given to the third year secondary school science students with the aim to uncover the students' problems with English scientific text reading comprehension and areas that create difficulties for them. The other questionnaire will be designed to get the target students' English teacher views about the main difficulties that face both of him and his learners while dealing with a particular English scientific text and to know his teaching strategies of the reading skill applied for scientific texts. To back up such

teacher's views, a similar questionnaire will be given to other colleague teachers teaching the same students' level and branch.

It is obvious that the approach of our research will be mainly descriptive which is suitable for like this case study. Here are some of the common features related the descriptive approach as described by Herbert W.Seliger and Elana Shohamy (1989: 113/133) in their book entitled "Second Language Research Methods".

They state that the descriptive research involves a collection of techniques used to specify, delineate, or describe naturally occurring phenomenon without experimental manipulation. According to them, the descriptive approach is often *deductive* and begins with preconceived hypothesis, a theory or a specific research question and a narrower scope of investigation. In addition, they insist that the descriptive research is both *quantitative* and *analytic* in the sense that it deals with a naturally occurring phenomenon, using data which may be either collected first hand or taken from already existing data sources such as data from other studies, student records, and so on. Gathering a data is generally accomplished in a number of ways such as: surveys, questionnaires, interviews, and so on. The data gathered is to be analysed by the researcher later on to deduce facts and draw meaningful conclusions at the last stage of the research.

The following table summarises the main stages of carrying out a descriptive study.

- | |
|--|
| <ol style="list-style-type: none">1-Decide on the question.2-Select the population.3-Determine methods for data collection.4-Organise and analyse the data. |
|--|

Figure 1.1: Procedures for Carrying out a Descriptive Study.

(Adapted from Seliger and Shohamy 1989)

Two of the main data collection tools used in the descriptive research and particularly in our thesis are the questionnaire and the observation. Here are two concise definitions of both tools.

1-8-1-Questionnaires

A questionnaire is primarily a series of well organised and structured written questions for which the respondent has to provide the answers that would constitute the primary data for the research. According to Seliger and Shohamy (1989: 126), a questionnaire may consist of questions or other stimuli that either limit responses to a very narrow range of possibilities or allow more latitude in response. It should be mentioned that there are two types of questionnaires: open and close-ended questionnaires. Open-ended questionnaire consists of a list of questions that accept a variety of answers without restriction at length or depth. However, close-ended questionnaire comprises one type of questions that accept specific answer selected from a pre-defined range of possibilities. As far as the present research is concerned, we have resorted to the use the open-ended questionnaire because it is easier to administer and easier to tabulate and analyse, too.

1-8-2-Observation Sheet

Descriptive data may be also collected by the use of observation. Observation involves the systematic viewing of specific phenomenon in its proper setting to gather data for a particular study. According to Seliger and Shohamy (1989:127), descriptive data may be collected by observing the target language activity or behaviour and noting only those aspects of the event which are of interest for the research. Most importantly, Seliger and Shohamy (1989:162) assert that in second language acquisition research , observations are most often used to collect data on how learners use language in a variety of settings , to study language learning and teaching processes in the classroom ,and to study teachers and students' behaviour.Since most of these points are meant to be covered by our present study , using observation as a data gathering tool for such kind of research would be suitable and much more adequate.

1.9-Conclusion

This has been a brief description of the learning situation and the research methodology of our research. We have tried to introduce some major prominent points qualifying such target learning situation .Thus, it has been necessary to shed light on some important elements such as: aims and objectives of teaching English, approaches of English teaching, problems of English teaching, the organisation of the textbook and finally a description of the target students' profile. It must be mentioned that through the introduction of these major learning situation components, the aim was to back up our study with a solid background that would pave the way for the following chapters.

Chapter 02:

Review of Literature: Reading Comprehension and Factors
Influencing Reading English Scientific Texts

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2.1-Introduction

This chapter will be devoted to discuss some major features that are related to the reading skill in general and to reading scientific texts in particular. This will include the main purpose of teaching reading in general, some definitions and theories related to the different reading skills. To move smoothly towards talking about the main factors and difficulties that hinder the “terminale” students’ reading comprehension of scientific texts which is the main focus in the present study, an ESP transitional background in this chapter will better serve for that purpose. This is going to include some important concepts related the ESP and some basic features that are relevant to the reading of ESP texts. The chapter will close up with a highlight of some major concept characterising the scientific discourse and the most prominent factors that are involved in the reading anxiety of English scientific text by EFL learners and that can influence their reading comprehension ability to such type of text.

2.2-Definition of Reading

Reading is one of the four language skills that was for a long time of minor importance in comparison to speaking and writing. The latter have often been considered as active skills while reading and listening as passive. However, many linguists do not agree on the dichotomy of passive and active skill in the sense that reading is regarded as an active and creative mental activity. Goodman (1996: 90), for instance, argues that “*Readers have an active brain that they actively use to make sense of written language*”.

Definition of reading has often ranged between two opposing views, one focusing on the process of reading and the other focusing on the result of that process, the product.

According to the first view, reading is considered as a cognitive activity where the reader is considered as an active processor of information during the real time of the reading task. It is the interaction between the reader and the text. Many operations

happen during the process of reading; they include looking at print, deciphering the marks on the page, recognising words, deciding what they mean and how they relate to each other. According to Alderson (2000), this process is likely to be dynamic, variable and different, not only for the same reader on different texts at different times and different purposes, but also for different readers on different texts at different times and different purposes.

Whereas the product of reading is comprehension. In other words, the amount of information the reader has gathered in the end as a result to his or her understanding to the text. Contrary to the first process approach, this approach to reading is based on the view that "*although readers may engage in different reading processes, the understanding they end up with is the same*". Alderson (2000: 04) state, "*What matters, then, is not how you reach that understanding, but the fact that you reach it*". In recent years, the Product Approach to reading has become unfashionable as researchers have concentrated their efforts on understanding the process.

As a matter of fact, one cannot stand in favour of an approach to another since they both correlate to a more complete and adequate definition of reading which is as follows: Reading is an interactive process between a reader and a text leading to the creation of meaning.

The recent approach which is the process of reading inspired the cognitive advocates of reading to a significant question: "*What goes on in the reader's visual system and mind during the process of reading?*" Hence, three different reading models appeared in an attempt to provide an answer for such an inquiry: the bottom up, the top – down model and the interactive one.

2.2.1-Bottom – up Model

According to Nunan (1991), the bottom – up model reading is viewed as the process of meaning interpretation in which the language is translated from one form of symbolic representation to another. In other words, in the bottom – up model, the

reader begins with the written text (the bottom) and constructs meaning from letters, words, phrases and sentences found within, and then processes the text in a linear way. Clearly, in the view of this driven model, the reader seems to play a relatively passive role because the basis of bottom – up processing is the linguistic knowledge of the reader. It is clear also that in bottom –up reading model, as Gough (1972) clarifies,

“The emphasis is on the written or printed text and on how readers extract information from the printed page in a completely systematic fashion.”

It was Gough (1972) also who provided a detailed description of how the reader processes text from the moment she or he looks at the printed words until the time when she or he derives meaning from words. This model is based on evidence drawn from laboratory studies of adult readers engaged in letter and word recognition tasks. Gough's models of reading hold that the reader takes in data from the page in sequence. In brief, this model suggests that the reader starts with letters, which are recognised by a SCANNER. The gathered information is then passed to the DECODER, which converts the strings of letters into a string of systematic phonemes. This string is then passed to the LIBRARIAN, where it is recognised as a word with the help of the LEXICON, culminating in the transfer of the input from Primary Memory to a magical device labelled MERLIN which applies syntactic and semantic knowledge to assign meaning to the sentence. This sentence then goes to TPWSGWTAU (The Place Where Sentences Go when They Are understood).It should be known that Gough's model is organised at two levels of components: *text units* which are arranged in order of size, letters, words, then sentences and *processing components* namely scanner, decoder, librarian, the Merlin.Gough's map to the bottom-up model seems to clarify better how the reading process takes place and how meaning is constructed in the mind of the reader.However,one major drawback of this model is that it emphasises the text as an input and textual information is considered as the main starting stimulus factor which influences reading .Thus, various readers, accepting the author as authority, are expected to come up with identical interpretations of a given text. The reader is simply seen as a passive decoder of sequential graphic-phonetic-syntactic and semantic systems in that order.

2.2.2-Top-down Model

In the top-down model, the focus is on the reader's prior knowledge and expectations about the text. More emphasis is put on the interaction between the reader and the text rather than the graphic forms of the printed pages. The reader ensures his active role in the reading process by bringing the interaction his or her available knowledge of the subject, knowledge of and expectations about how language works motivation, interest and attitudes towards the content of the text. According to Goodman (1967) and Smith (1971), theories that stress top-down processing hold that readers form hypotheses about which words they will encounter and take in only just enough visual information to test their hypotheses. In the words of Goodman, reading is a "*psycholinguistic guessing game*." In this approach, it is the reader's mind which manages the text elements and not the opposite. In other words, the reader is not bound by the text. He or she utilises his or her general previous knowledge of a world of a particular text to make intelligent guesses about what might come next in the text. Goodman's (1976) top-down model proposes four processes in reading:

- Predicting (that is making predictions about the grammar structure in a text),
- sampling (that is sampling the text to confirm predictions),
- confirming guesses, and
- correcting guesses.

It is apparent that prediction precedes confirmation which precedes correction. Goodman insists also on the reader's previous knowledge of the grammar and syntax of the text in order to minimise their dependence on visual decoding and grapho-phonemic knowledge (association of sounds and graphemes).

Smith (1971), another leading figure of the top – down model o reading, states the reader's background knowledge, experience with the reading process, knowledge of the structure and pattern of the text and of specific text types are of an extreme importance in the construction of meaning during the processing of any type of information, including print. Just like Goodman, Smith puts on much emphasis on the role of the prediction of meaning to understand a text. With regard to the nature of reading, Smith cites four Characteristics:

- Reading is purposeful: people read for specific reasons and with specific goals.
- Reading is selective: readers attend only to what is necessary to their purpose.
- Reading is based on comprehension: the reader brings certain prior knowledge to the text and adds to it the information and ideas gathered from the reading.
- Reading is anticipatory: the interaction of prior knowledge, the expectations of Comprehending and the purpose in reading lead readers to anticipate text content.

To sum up , one different point between the top-down and bottom –up model is that in the former, the reader starts with making predictions and hypotheses and attempts to verify them by working down the printed stimuli ;whereas, in the latter , the reader starts with the printed stimulus and work their way up to the higher-level stages .Although in top-down model the reader is seen as an active individual who brings to the text a wide range of information , ideas and beliefs and who coordinates a range of skills and strategies to facilitate reading, he she may fail to generate predictions when he or she has little knowledge of the text topic. Besides, it may take more time to generate predictions than simply to recognise the words.

2.2.3-Interactive Model

As an aftermath of the assumption held by theorists who recognised the importance of both the reader and the text in the reading process, the interactive reading emerged. It simply denotes, as its name suggests, an interaction between the reader and the text. According to Rumelhart(1977) and Stanovich (1980), The interactive model stressed both what is on the written page and what a reader brings to it using both top-down and bottom-up skills. Interactive theorists agree on the fact that two main elements determine the construction of meaning in the interactive model: prior knowledge and prediction and the rapid and accurate processing of the actual words of the text. McCormick (1988) asserts this fact when he states that the interactive model attempts to amalgamate both features of top-down an bottom-up models by taking into account the strong points of both models, and tries to avoid the

criticisms levelled against each , making it the most promising approaches to the theory of reading today. Rumelhart (1985) from his part stresses this notion of processes' bridge in the interactive model when he states that reading is at once a perceptual and a cognitive process. It is a process which bridges and blurs these two traditional distinctions. Moreover, a skilled reader must be able to make use of sensory, syntactic, semantic, and pragmatic information to accomplish the task. These various sources of information appear to interact in many complex ways during the process of reading. Here are both of Rumelhart and Stanovich's conceptions to the interactive model of reading.

According to Rumelhart's (1977) interactive model:

1-Linear models which pass information only in one direction and which do not permit the information contained in a higher stage to influence the processing of a lower stage contain a serious deficiency. Hence, the need for an interactive model which permits the information contained in a higher stage of processing to influence the analysis that occurs at a lower stage.

2- When an error in word recognition is made, the word substitution will maintain the same part of speech as the word for which it was substituted, which will make it difficult for the reader to understand (Orthographic knowledge).

3-Semantic knowledge influences word perception (Semantic knowledge).

4-Perception of syntax for a given word depends upon the context in which the word is embedded (Syntactic knowledge).

5-Our interpretation of what we read depends upon the context in which a text segment is embedded (Lexical knowledge).

All the five mentioned knowledge sources provide input simultaneously. These sources need to communicate and interact with each other, and the higher-order stages should be able to influence the processing of lower-order stages.

According to Stanovich's (1980) interactive-compensatory model:

1- Top-down processing may be easier for the poor reader who may be slow at word recognition but has knowledge of the text topic.

2- Bottom-up processing may be easier for the reader who is skilled at word recognition but does not know much about the text topic.

Stanovich's model states, then, that any stage may communicate with any other and any reader may rely on better developed knowledge sources when other sources are temporarily weak.

To sum up, the interactive reading theory views the reader as an active participant whose both past knowledge and current linguistic knowledge play a major role in the reading comprehension task. Thus, the debate has ceased about whether reading is language –based (bottom-up) or knowledge –based (top –down). It becomes evident for most people now that successful reading involves a balanced interaction between bottom-up and top-down processing skills. It becomes apparent also that the reading field has been well-determined by three conspicuous landmarks: the reader, the text and the purpose of reading.

2.3-Reading Purposes

Reading is taught for many purposes. J. Harmer(1998) asserts this fact when he states that there are many reasons why getting students to read English texts .In the first place , many of them want to be able to read texts in English either for their careers , for study purposes or simply for pleasure. He indicates that reading is useful for other purposes too: any exposure to English (provided students understand it more or less) is good thing for language students. At the very least, some of the language sticks in their minds as a part of the language acquisition. According to him also, reading texts provide good models for English writing in the sense that while teaching the skill of writing , we will need to show the students models of what we are encouraging them to do. Reading texts also provide opportunities to study language: vocabulary, grammar, punctuation, and the way we construct sentences, paragraphs and texts. Lastly, he states that good reading texts can introduce

interesting topics, simulate discussion, excite imaginative responses and be the springboard for well-rounded, fascinating lessons.

Davies (1995) from his part suggests five categories of reading purpose: 1. reading for pleasure, 2. reading for a general impression, 3. reading for organising reading and study, 4. reading for learning content or procedures, and 5. reading for language learning.

- Reading for pleasure: the main purpose in this kind of reading is not to look for information but rather to enjoy.
- Reading for general impression: aims at deciding whether or not to read after having a global impression of the idea of the text and the writer's point of view.
- Reading for organising reading and study: in this category, the reader identifies the main content of the text and decides which section of it to start with according to the specific question(s) he or she likes to answer.
- Reading for learning content and procedure: the reader tries to get comprehension of new concept and follow instruction of the text.
- Reading for language learning: the reader aims to use the text as a basis of learning in terms trying to extract from it new vocabulary, identifying new structures and collocations and using the text as a model for writing.

In short, reading in a foreign language has different motives and purposes that would characterise the specific situation of foreign language reading and would converge to some important reading skills.

2.4-Types of Reading

It should be known that there exist different types of reading of which good readers should be aware just because they are basic skills in the reading activity. Let us see some of the most common reading skills.

2.4.1-Silent and Oral Reading

Reading aloud is closer to pronunciation than to comprehension. The reader shares information that the members of the audience want. Zintz and Maggart (1989) admit that the “real-life” purpose of reading aloud to others is to convey information to them, to entertain them, or to share a good story that they do not have. Silent reading is considered to be a “*see and comprehend process*” rather than a “*see, say and comprehend*” process. Silent reading also focuses on comprehension based on background information and some visual data. This silent reading has been said to help the development of structural awareness, build vocabulary, and to promote confidence in the language. However, silent reading has been neglected in the elementary school programmes for so many years despite its importance in actual life. Because of this growing importance, most students in current school typically read silently before completing a comprehension task (e.g., true or false activities or multiple choice questions). Therefore, the training in oral reading seldom happens in schools because simply it rarely functions in actual life.

For this reason, our focus in this study will be on silent reading since it is the most common type of reading practised with students in our secondary school English class.

2.4.2- Scanning and Skimming

Skimming and Scanning are two important and useful advanced reading skills. Skimming is a reading skill which demands top most speeds. G. C. Ahuja and Pramila Ahuja (1987) say that it is a method of quickly gathering information from the printed page. Learning to skim is a valuable academic exercise. Dechant and Smith (1977) clarify that in scanning the reader runs his eyes on the page with the purpose of finding an answer to a specific question. In skimming the reader does not try to find out the answer to any question. Skimming is a rapid reading technique and scanning is a technique to find the detailed facts in a very fast manner. In an answer of what reading skills students should acquire, J.Hamer (1998) states that students, like the rest of us, need to be able to do a number of things with a reading text. They need to be able to

scan the text for particular bits of information they are searching for. This skill means that they do not have to read every word and line; on the contrary such an approach would stop them scanning successfully. Students also need to be able to *skim* a text- as if they were casting their eyes over its surface-to get a general idea of what it is about. Just as with scanning, if they try to gather all the details at this stage, they will get bogged and may not be able to get the general idea because they are concentrating too hard on specifics.

This was an introduction to some major concepts and definitions related to the skill of reading in general. However; our main concern in our thesis is focusing on a type of reading of much more specific type of texts which is the English scientific text. Hence, we are going to deal with specific type of texts that belong to a field that is far from general purpose English reading (GPE) and seems closer to English for specific purposes texts' reading (ESP) ;it is more precisely related to English for science and technology field (EST). Thus, it is advisable to have a general outlook on some major concepts and texts' features that are relevant to the ESP field before tackling the most important aspects that underlie the scientific texts' reading comprehension skill.

2.5-English for Specific Purposes' Discourse

Over recent years, ESP (English for Specific Purposes) has emerged as a particular field of the English language teaching. It's course is claimed to be more specific in purpose than the one designed for GPE. Since the main focus of this study is to cover important aspects related to more specific field of ESP which is scientific texts' reading, it is better to set an ESP background for the analysis of such type of texts. This is going to include some major concepts and definitions related to the ESP field and a brief outlook over some striking features characterising ESP discourse in general.

2.5.1-Historical Background

According to Hutchinson and Waters (1978),” *ESP was not a planned and coherent movement, but rather a phenomenon that grew out of a number of converging*

trends ...” .Thus, they identify three main reasons that led the emergence of all ESP : worldwide demands ,revolution on linguistics and focus on the learner.

2.5.1.1-Worldwide Demands

The end of the Second World War in 1945 was characterised by an enormous growth and expansion in scientific, technical and economic field. In such a role, English was to play a significant role when the United States was notably the leading economic power of that time. English became accepted then as international language of technology and commerce. Thus, it created a new generation of learners who knew specifically why they were learning a language. Businessmen and women wanted to sell their products; mechanics had to read instruction manuals; doctors needed to keep up with developments in their field; and a whole range of students whose course of study included textbooks and journals only available in English also needed ESP. All these and many others needed English and, most importantly, they knew why they needed it.

The Oil Crises of the 1970s was to accelerate this development. A massive flow of western expertise and funds, thus, moved into the oil-rich countries. English suddenly became big business, and commercial pressures began to exert an influence. Time and money constraints created a need for cost effective courses with clearly defined goals.

2.5.1.2-A Revolution in Linguistics

Traditionally the aim of linguistics had been to describe the rules of language usage, that is, the grammar. However, new studies appeared to discover the recent ways of language learning or what Widdowson (1978) called the language use in real communication. One finding of this research was that the language we speak and write varies considerably, and in a number of different ways, from one context to another. In English language teaching this gave rise to the view that there are important differences between, say, the English of commerce and that of engineering. These ideas married up naturally with the development of English courses for specific groups

of learners. The idea was simple: if language varies from one situation of use to another, it should be possible to determine the features of specific situations and then make these features the basis of the learners' course.

Many articles appeared afterwards concerning research into nature of particular varieties of English including descriptions of written scientific and technical English by Ewer and Latorre (1969), Swales (1971), Selinker and Trimble (1976) and others. Most of the work at this time was in the area of English for Science and Technology (EST) and for a time ESP and EST were regarded as almost synonymous.

In short, it became clear for the first time that teaching the needed English to a particular group of students could be identified by analysing the linguistic characteristics of their specialist area of work or study. Hutchinson and Waters (1987) point to the fact that "*Tell me what you need English for and I will tell you the English that you need*" became the guiding principle of ESP.

2.5.1.3-Focus on the Learner

New evidence emerged in the field of language teaching and educational psychology which focused on the needs of the learners' needs, interests and attitudes to learning. Learners were seen to have different needs and interests, which would have an important influence on their motivation to learn and, therefore, on the effectiveness of their learning. This gave support to the development of courses in which 'relevance' to the learners' needs and interests was paramount. The standard way of achieving this was to take texts from the learners' specialist area (e.g., texts about biology for biology students etc.). The assumption underlying this approach was that the clear relevance of the English course to their needs would improve the learners' motivation and thereby make learning better and faster.

The growth of ESP, then, was brought about by a combination of three important factors: (a) the expansion of demand for English to suit particular needs, (b) developments in the fields of linguistics, and (c) developments of educational

psychology. All three factors seemed to point towards the need for increased specialisation in language learning.

2.5.2-Definition of English for Specific Purposes

Since its development as an applied linguistic discipline, ESP has received varied definitions. Many scholars tried to find out a comprehensive definition that covers all aspects of this new trend of teaching foreign languages. Mackay and Mountford (1978), for instance, defined ESP, on one hand, as the teaching of English for a "*clearly utilitarian purpose*" which is defined by the learners needs. These needs in turn determine the ESP curriculum to be taught. They defined it, on the other hand, as the special language that takes place in a particular setting by particular participants. Strevens (1977) also argued that ESP courses are those which are based on the analysis of participants 'needs as a key and crucial element.

As for a broader definition of ESP, Hutchinson and Waters (1987:19)) theorise that "*ESP is an approach to language learning, which is based on learner need*". On a similar stand, numerous non-specialist instructors use an ESP approach in the sense that their syllabi are based on the analysis of their learners' needs and their own personal specialist knowledge of using English for real communication. The above attempts to define ESP reveal that most ESP scholars agree on three key elements to set up a clear definition to ESP: (1) the nature of the language to be taught, (2) the learners, and (3) the setting within which the two previous elements take place. It should be noted that these three aspects of ESP are closely connected and can be combined to establish that ESP is the teaching of specific English to specific learners in a particular setting to achieve a utilitarian goal or purpose. Because ESP teaching depends and varies according to the learners' needs and the context in which English is used, different types of ESP emerged to cover important disciplines that represented the different learners' needs.

One common point among all these definitions is that they consider the learners' needs as the core element of ESP. Furthermore, achieving aims should be

based on designing teaching materials that would cope with such learners' needs and interests in English language learning.

2.5.3- Types of English for Specific Purposes

ESP is a short term which refers to “*English for Specific Purposes*” which is actually an umbrella that covers different categories of disciplines that differ according to the learner’s needs. Hutchinson and Waters (1987) have developed a “*Tree of ELT*” in which the subdivisions of ESP are clearly illustrated. ESP is broken down into three branches: English for Science and Technology (EST), English for Business and Economics (EBE), and English for Social Studies (ESS). Each of these subject areas is further divided into two branches: English for Academic Purposes (EAP) and English for Occupational Purposes (EOP). Hutchinson and Waters (1987) mention that one cannot easily differentiate between EAP and EOP in the sense that people can study and work simultaneously as that it is also likely that in many cases the language learnt for immediate use in a study environment will be used later when the student takes up, or returns to a job . It appears that the end purposes of both EAP and EOP are the same employment.

Strevens (1977) from his part suggests the following ESP taxonomy that looks quite inspired by Hutchinson and Waters’ “*ELT Tree*”:

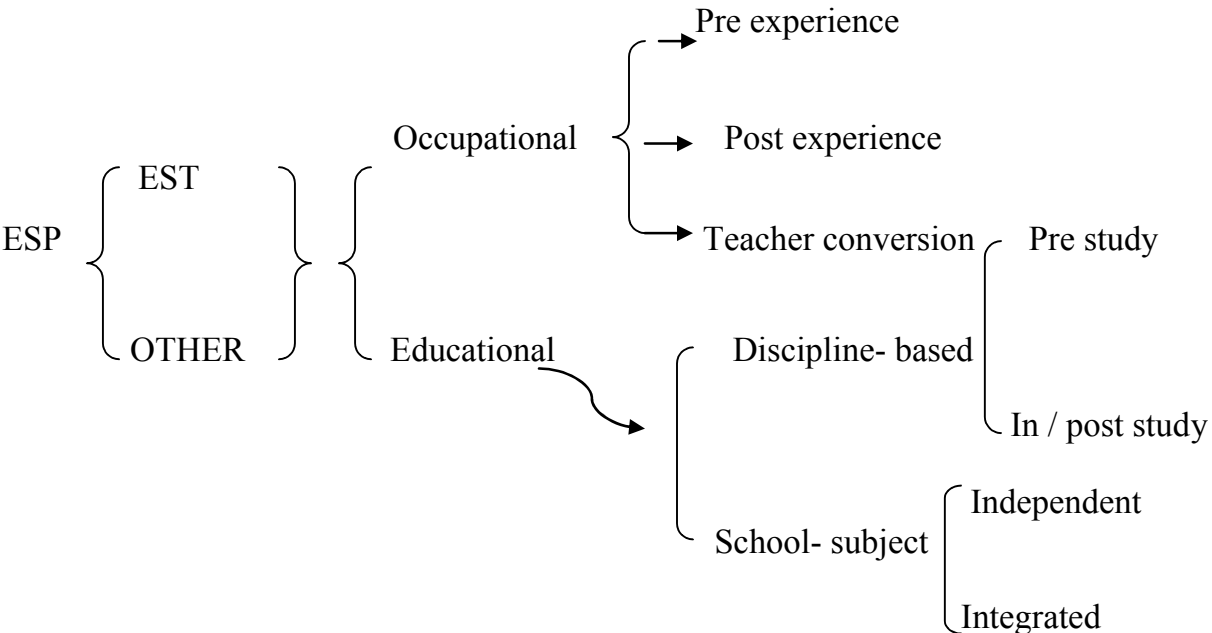


Figure 2.1: The Taxonomy of ESP (Strevens, 1977)

Strevens (1977) proposed a taxonomy in which ESP was subcategorised into two main sub-divisions; English for Science and Technology (EST) and English for Other Purposes (EAP): English for Academic Purposes (EAP), English for Occupational Purposes (EOP), etc...(EST) which is English for Science and Technology covers the area of scientific and technical writing. A whole issue for (EST) will be down highlighted in this research. English for Academic Purposes (EAP) is primarily concerned with teaching learners in academic and educational institutions how, for instance, to read books, to take notes and to write reports. English for Occupational Purposes (EOP) train learners for their future work, primarily to communicate and secondly to read.

It should be known that there other classifications of ESP proposed by other ESP scholars. However, they all end up with the idea that English for Academic Purposes (EAP), English for Occupational Purposes (EOP) and English for Science and Technology (EST) constitute the main broad branches of ESP. Our main concern among the above mentioned ESP branches is the field of English for Science and Technology (EST) since our study will focus on the reading of scientific texts which is a prominent constituent of EST discourse.

2.5.4-Definition of English for Science and Technology Discourse

English for Science and Technology (EST) has been often considered as one of ESP major subdivisions. It is an approach to teach English scientific discourse. It has already been mentioned in the course of ESP development that there were an increasing number of scientists and technologists who needed to learn English for a number of purposes related with special technical field. Thus, EST emerged as an adequate branch of ESP with the aim to satisfy those learners' needs. In this regard, Kennedy & Bolitho (1984: 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). In fact,

for many years, EST has been considered as that type of English devoted for science and technology. Just like ESP, various definitions have been given to EST. Widdowson (1979:45), for instance, defines EST not as a separate operation but as a development from an alternative realisation of what has already been learnt, that is to say, of existing knowledge. In other words, EST is an amalgamation of the students' background use of scientific knowledge and their English language usage. Many other linguists share Widdowson's view as Hutchinson and Waters (1987) who assert that the knowledge that science students possess should be used as a base for target language learning. Furthermore, Dudley- Evans and St. John (1998) state that

“English for specific purposes, and consequently (EST) which is a branch of the former, is centred on the language appropriate to the activities of the discipline it serves in terms of grammar, lexis, register, study skills, discourse and genre.”

Hence, according to the previously mentioned fact, an EST curriculum should enable the students 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.

It is worth mentioning that Swales (1985) classified three categories under EST:

1. The first one deals with the level of education depending on the context in which it is taught, for example, English taught in: secondary school, and universities.
2. The second category concerns the subject matter. That is, when English is used for general science, biology, and so forth.
3. The last category deals with the types of activities involved such as: reading, writing, and attending seminars.

Last but not least, it should be mentioned that our study will focus on the third category, namely, the scientific texts' reading comprehension analysis. Thus, in the next stage of our discussion we will attempt to present a portrait of Widdowson's description of the scientific discourse.

2.5.5-Widdowson's Description of Scientific Discourse

Widdowson is considered as one of the most prominent figures who attempted to give a detailed description of the scientific discourse characteristics in Great Britain in particular. Before tackling what exclusive views Widdowson contributed within the conception of EST discourse, let us first depict some of Widdowson' criticism to those who still believe that EST can be adequately taught through a typical register of specific discourse through the identification of most frequent syntactic and lexical structures. In this regard, Widdowson (1979:38) states,

“I have expressed elsewhere my doubts about the efficacy of the structural approach in general and about its appropriateness for the teaching of science and technology in particular.”

Moreover, Widdowson stands against all views that care only for the surface structure and neglect the deep structure in scientific discourse. According to him, the identified linguistic patterns represent only the apparent surface structure of EST discourse which become with little effect whenever isolated from their context. In fact, it is just a manifestation of the English language usage without any reference to the communicative aspects of language. According to Widdowson (1978: 52), the deep structure is strongly linked to the nature of the scientific text with which a secondary universal code of communication is shared by all scientists in which

“The scientific discourse is a universal mode of communicating, or universal rhetoric which is realised by scientific texts in different languages by the process of textualisation.”

Widdowson considers the scientific discourse a composite of two but related elements: the deep structure that holds the feature of textualisation which is realised by means of language or the surface structure. By textualisation, Widdowson refers to the

whole notions, concepts and procedures that characterise the scientific discourse. Widdowson (1979:39) also denotes that the communicative functions of scientific discourse are often neglected whenever a transition from ELT to EST is carried out. For such drawbacks, Widdowson suggested some major remedies. Before hand, he (1979:42) defined the scientific discourse as the verbal and non-verbal realisation of communicative system of science. By non –verbal realisation, Widdowson refers to the formulae, diagrams, charts and graphs that constitute modes of communication and at the same time other characteristics of scientific discourse. According to him, scientific discourse is a set of concepts and procedures that are independent not only in language but also in subject. In other words, the organisation of language in its functional realisation to produce coherent text in the area of science is universally similar and the only difference is in the text form. His concept to the scientific discourse universality is simply shown in the following figure:

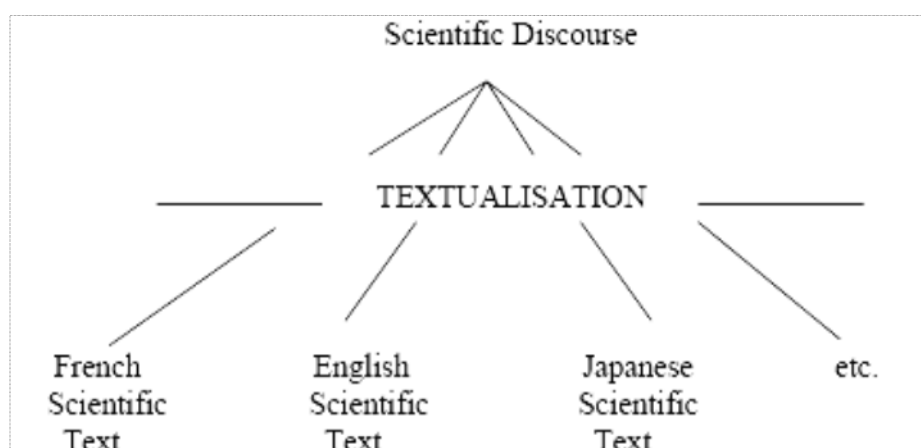


Figure 2.2: Scientific Discourse, Universal for All Languages (Widdowson 1979: 52)

Furthermore, he made hint to an important fact when he states that a distinction should be made between teaching the discourse of science as a subject and teaching it as a discipline. In this regard, he (1979:52) says,

“The discourse of scientific instruction of science as a subject, such as appears in textbooks, for example, is different from the discourse of scientific exposition, of science as a discipline, and such as appears in research papers.”

He explains that this difference lies in the fact that teaching sciences to the learner at the early stages is much supported by the learner's own experience; or let us say his primary culture. However, along with his or her instruction, the learner develops a secondary culture and approximates to a scientist. At such a stage, the discourse of science as a subject becomes a means to present the discourse of science as a discipline. Again and along with the idea of textualisation, Widdowson (1979) states that the learner in a teaching situation can use both the previous knowledge of science acquired in his or her own native language and the knowledge of English (usage) to produce an English scientific discourse (use). The following figure summarises Widdowson's concepts' conversion towards a more practical English scientific discourse:

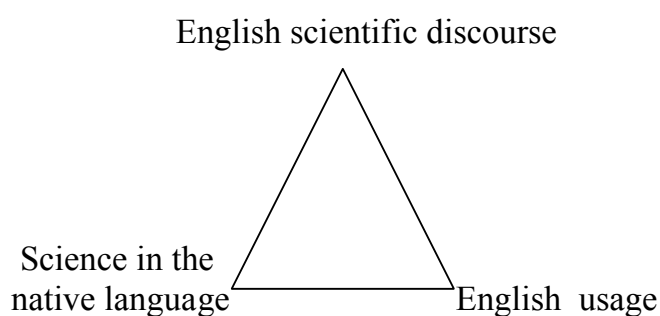


Figure 2.3: Widdowson's Conception of the English Scientific Discourse

To conclude , the last idea of Widdowson's conception towards a more adequate English scientific discourse will raise our attention to the way and methodology practised with English scientific discourse and the presentation stage of the reading comprehension skill of English scientific texts ,in particular , in the Algerian school .Thus, it is fruitful to devote one stage of this research to talk about the need of the English teacher to seek help and directions from his science colleagues when coming to present a scientific knowledge to his or her learners. However, for the moment let us carry on with the major qualities that generally characterise the scientific text.

2.5.6-Scientific Text

It has been already mentioned in the previous discussion about Widdowson's(1979) definition of scientific discourse that it is the verbal and non-verbal realisation of communicative system of science .Any particular realisation can only be presented in a form of a written text which generally carries the other non-verbal devices such as : tables, graphs, and diagrams. According to Walsh (1982), the scientific text is made up of three components: the linguistic, the conceptual and the rhetorical component. By the linguistic component, Walsh refers to the vocabulary and syntax that specify the scientific text. Moreover, he states that the scientific text vocabulary can be distinguished into three parts: the subject area specific terms, sub-technical vocabulary specific to none and general English vocabulary. Furthermore, Walsh indicates that there is no specific scientific syntax since it is similar to that of GE, but some syntactic structures are frequently used in determined scientific structures than in others, for instance, the passive voice with scientific texts. Concerning the conceptual component, it is actually the knowledge that the reader brings to the text in an attempt to analyse the writer's ideas and bring more enrichment to the information of the text. The rhetorical component refers to the style and the way of language presentation and its distinctive organisation in order to achieve predetermined purposes and functions .One of the prominent figure who set up a whole rhetorical approach based on the importance of rhetorical organisation of scientific text is Trimble .His aim was to reach a more effective reading comprehension of scientific texts by non-native speakers. According to Trimble (1985), the scientific text can be analysed 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.

As far as the scientific text is concerned, Trimble (1985) considers the paragraph as the key element of the EST discourse teaching where various pieces of

information can be depicted in a patterned way .Hence, Trimble (1985:15) 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 organised 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...”

Trimble (1985: 12) defines the rhetorical function or purpose as *“a name for what a given unit of the discourse is trying to do.”* Trimble lists five rhetorical functions, or purposes, that are most frequent in written scientific discourse which are description, definition, classification, instruction, and visual-verbal relationship. Moreover, Trimble (1985: 15) differentiates between two types of paragraphs: the physical and the conceptual paragraph. The physical paragraph is determined by the organisation and the arrangement of sentences on a page with an indentation and a space between each paragraph. On the contrary, the conceptual paragraph *“consists of all information chosen by the writer to develop a generalisation”*. Thus, the conceptual paragraph can just be developed in one paragraph form and it is a one-to-one correspondence or it may require more than one paragraph , it is one -to-more-than-one correspondence.

It is evident that Trimble brought important contribution to the field of EST discourse in general and to the rhetorical characteristics of scientific text in particular. We have attempted to introduce some of them at this stage .However, as far as our study is concerned , some other features of the scientific text will be tackled later when coming to discuss the main factors that influence the scientific texts’ reading comprehension and that hinder the students ‘ability to an easy understanding of this type of texts.

2.5.7-Factors Influencing Reading Scientific Texts

Various factors contribute in the difficulty to read scientific texts. This ranges from problems with language components (lexis, syntax) to rhetorical relationships and patterns that characterise the scientific text. Those factors and others which have been grouped in relation to three main items: The language, the student and the teacher, will be under focus in the following discussion.

2.5.7.1-The English Scientific Text's Linguistic Features

Language is the only vehicle through which science can be expressed. Language is used in science not only to coin technical terms but also to present the findings and describe the scientific facts. However, students in the secondary school still encounter difficulties to understand the language used in their English textbooks each time a scientific text is explored. This is due to their ignorance of the various linguistic techniques which are used by scientific language such as grammatical metaphors and nominalisations. Such techniques and others increase the level of technicality of scientific terms and make them difficult to grasp. Before discovering the lexical features characterising the scientific language, let us know first where most English technical terms come from.

2.5.7.1.1-The Latin and Greek Background

Most technical terms currently used by science in English come from two "dead" languages, namely, Latin and Greek. Because both of these two languages are not at the moment used as the spoken languages of any community, the terms derived from them are emotionally neutral and hence they are more suitable to meet the requirement of the scientific discourse that tends to be neutral of emotion and be of an impersonal nature. Along with history, there was an urgent need for new words to name the new objects and these two languages provided the sciences with a number of root words which with the help of a small number of affixes a large number of technical terms were derived.

The following is a chart of some common Greek and Latin prefixes.

Latin Prefix/ Greek Prefix	Meaning	Latin Prefix/ Greek Prefix	Meaning
a-, an-	"alpha privative", <i>a negative</i>	intro-	Within
ab-	away from	intus-	Within
ad-	to, towards, near	meta-	with, after, beyond
ambi-	both	meta-	with, after, beyond
ana-	up, back again, throughout, against	opistho-	Behind
ante-	before, in front of	palin-	Again
anti-	against	para-	along side of, beside
apo-	away from	per-	through, thorough, complete
bi-/bis-	twice, double	peri-	around, near
cata-	down, across, under	proso-	onwards, in front
circum-	around	re-	back, again
con-	with	retro-	Backward
contra-	against	semi-	Half
de-	down, from, away from	sub-	under, below
di-	two, twice, double	super-, supra-	above, upper
dia-	through	syn-	With
dis-	apart, removed	trans-	Across
dys-	hard, difficult, bad	ultra-	Beyond
e-, ex- (Lat.) ec- ex- (Gk.)	out of	<p>Table 2.1: Latin and Greek Suffixes. (Adanted from John Hough .1953)</p>	
ecto-	outside		
exo-	outside, outward		
en-	in		
endo-	within		
epi-	on, upon		
extra-	outside, beyond, in addition to		
eu-	well, good, easy		
hemi-	half		
hyper-	over, above,		
hypo-	below, under		
in-	in, into, on You often see this prefix as <i>in</i> . Used wtih verbal roots.		
in-	not; <i>occasionally</i> , beyond belief		
infra-	below		

2.5.7.1.2-Technical Vocabulary

Examples of the above mentioned affixes increase the level of technicality of most coined scientific terms as that their denotation's ignorance by our students present a real handicap for them to decode their meaning. In this regard, Trimble (1985) states that there are two areas of problems concerning English for science and technology for N.N.S. The first being the rhetorical relationships and the second being the lexical element of sub-technical vocabulary and the noun-compounds. It is important to mention that the students' real problem lies not only in the specific scientific technical vocabulary but even in the non-technical terms that involves the words of general language. In this respect, Godman and Payne (1981: 24) classify the lexis of science into two categories: *technical terms* and *non -technical terms*. They define the technical ones as "*those for which there is a congruity of concept between scientists, whatever the language used.*" Non- technical ones, however, "*consist of all other terms occurring in the language of science*" This may cover the terms that may take a technical meaning in a particular field (Cowan 1974, refers to these as sub-technical vocabulary) and also the vocabulary items that would indicate time sequence , measurement , quantifiers , articles ect.. In a research made by Andrew Cohen et al (1979) at the Hebrew University of Jerusalem about the main problems that face non-native readers to specific English discourse discovered that the non-technical vocabulary created most of the problems to those readers especially that they carry much of the text's meaning. Here are some of the examples which Cohen et al (1979) gave to illustrate the category of non-technical vocabulary encountered in the students' texts : in the genetics study : *essential , giant , diversity , efficient , maintain , required, supplied and determined*; in the biology study : *pattern , however , resemble , predict , adequately and invariable* ;in the political science study: *decades , assertion , ambiguities and devices* , and in the history study : *discrepancy , futile and perceive*. As Kennedy and Bolitho (1984:58) explain, this type of vocabulary can cause ambiguity, "*the learner may know the 'general' meaning already and may be confused when he meets it in a context with a different meaning*".

To sum up, part of the problems that the students face in understanding the type of vocabulary encountered in the scientific texts is owed to their basic weakness in understanding the general terms belonging to GE. Thus, it is time to think of effective procedures to back up this students' failure to deal with the problem of general English vocabulary learning before seeking more efficient methods to teach the specific lexis that would belong to any particular field of ESP learning.

2.5.7.1.3-Nominalisation

Nominalisation is the replacement of active clauses by generating nouns that denote different processes and operations to form new concept in science. In simple terms it is to derive nouns from verbs, adjectives or even other nouns (e.g., *transform_transforming, useful _usefulness, and atom _ atomisation*). Nominalisations are used intentionally by scientists to make their scientific papers appear less “childish” and more academic. Deriving nominalisations may seem more complex because of the use of several various suffixes and different word endings. In the process of nominalisations, the author can package old information into a new noun or concept to serve as the starting point for conveying the next message. Halliday (1993) illustrates this fact in the following example, “...*both ethyne and nitrogen oxide are kinetically stableThe kinetic stability of nitrogen oxide shows...*”. The noun group (nitrogen oxide) +verb (are) +the adverb (kinetically stable), forming a clause structure, are compacted to a single noun group (*the kinetic stability of nitrogen oxide*) as the starting point for the next clause. Nominalisation can be also the direct cause for the generation of the heavy noun phrase subjects and objects. It is a common feature of scientific texts to carry subjects and objects of more than one word .This often causes significant difficulties for the young readers to decode their meaning. According to same study of Cohen et al., (1979), they state,

“In the genetics study, for instance, all but one of the seven sentences that the informant identified as being problematic had heavy noun phrases in them.”

In short, sentence structure which carries such kind of heavy noun phrases complicate the comprehension task and causes troubles for the young students who lose much of their attention and concentration whenever asked to get meaning across the lines of those long sentences. Thus, it is preferable to seek more simple forms of sentences that can convey the same amount of meaning with little amount of words.

2.5.7.1.4-Grammatical Metaphor

One other linguistic form that is often a feature of a scientific discourse at the level of sentence structure is the grammatical metaphor. In fact; it is the substitution of one grammatical structure by another. For example: *it dissolves quickly in water* becomes *its quick dissolving in water*. Quickly is an adverb in the first sentence is substituted by an adjective in the second sentence. This kind of transformation is known as grammatical metaphor. Halliday (1998) describes the grammatical metaphor as being the non-congruent form of meaning. When coming to identify the different kinds of grammatical metaphors. He points out that these variants are not definitely synonymous, but they are potentially co-presentational. According to A. Sharma and W. Anderson (2007),

“Scientists tend to perceive nature differently than the rest of us, and use a grammar especially that is different from the grammar of everyday discourses.”

This statement explains clearly the frequent occurrence of the grammatical metaphors in scientific discourse. Halliday (2004) gives another reason for the importance of the use of grammatical metaphors for recording scientific discoveries and events when he states that if we need to organise our knowledge in a systematic way, we need phenomena that are stable, that persist through time and that can be grouped into classes. Hence, and according to him, the nouns are the only grammatical forms that can assure this sort of stasis.

The grammatical metaphor also occurs when a verb (result in) or a noun (the result) substitutes for a conjunction (because). Unsworth (2001) inserts instances of some grammatical metaphors in the following sentences:*it transformed totally*

*because it was mixed with another substance or its total transformation was due to its mixture with another substance.....and also in ...The effect of the addition of lubricant was a decrease in friction instead of Lubricant was added, so the friction was reduced...*In scientific texts , examples like these of grammatical metaphors are so frequent .By the insertion of grammatical metaphors in their scientific writings , the scientists' aim is to compress as much information as possible in a short space.Knudson (1999) explains how metaphor occur in scientific discourse when he says that ,

“The process is often set off by the researcher struggling to understand a given phenomenon or a set of data, and then suddenly seeing and being able to explain these data by using a metaphor.”

Hence, the metaphor occurs as an aftermath of a long contemplation of a scientist of a scientific phenomenon and then attempts to set his or her findings in a plain way to the reader as that he admits of the metaphor's generative and innovative powers. It should be noted that there is another type of metaphors that are used in the formation of new knowledge. This would be the lexical metaphors .In scientific discussions, the main role of these lexical metaphors, according to Carl-Johan et al (2009) is *“to handle abstract information , often expressed in a mathematical or visual code , more directly.”* A good instance of this is, always according to Carl-Johan et al (2009),

“For example, scientific discussion and thinking can be facilitated by conceiving f DNA-molecule as ‘string’, even though everybody who takes part in scientific communicative practice understands that it is not a ‘ string’ in the every sense of the word.”

Although metaphors serve as an adequate means to transfer and communicate scientific knowledge to the readers, it is still a type of nominalisation that would generate heavy subject and objects at the level of sentence structure. In simple terms, our students have not yet reached that level of *“compact”* language forms to decode their meaning in an easy process.

2.5.7.1.5-Objective Precise Words

Terms used in scientific texts are very precise. This is due to the concealment of rhetoric of science. As Locke (1992) comments,

“It is a hallmark of the official rhetoric of science that it denies its own existence, that it claims to be not a rhetoric but a neutral voice, a transparent medium for the recording of scientific facts without distortion.”

Written scientific texts are meant to be objective with the sole purpose for transmitting knowledge without trying to persuade the readers. Thus, unlike the general English words’ meanings which may be affected when these terms are translated to another language due to the cultural interference, the words and phrases of the language of science have fixed meanings, and are not distorted as it happens to the words and phrases of general day-to-day language. The precise and objective terms of science make the language of science concentrated in its form and direct and straightforward in expressing facts and all these features emerge, of course, from the characteristics of science and its methods of research, analysis and presentation. Such features of preciseness and accuracy attributed to the scientific terms would contribute to establish a common feature to the scientific language that our students are not accustomed to when being involved in foreign language reading tasks sessions . As a result, reading scientific texts by our students, who generally hold the conception that the language sessions are normally devoted to tackle more literary ,poetic and even metaphorical language items, become a boring task and ,thus, affect their motivation towards such type of texts; a factor which we would talk about later on. Moreover and along with communication in a language class, Carl –Johan et al (2009) agree on the fact that the expert; who is the teacher in this case, and the novice; who is the student, may not have the same degree of the “*depth of intention*” with regard to the same term used by them. Carl-Johan et al (2009) clarifies this fact when they state,

“Although they may use the same terms, the underlying meaning is much deeper and richer in the language of the expert than in case of the novice.”

Clark (1996) claims that this discrepancy in depth of intention between the teachers and students can often be attributed to a lack of mutual ground. In other words, teachers and experts, because of their practical experience, their depth of intention in relation with a scientific term is much deeper. With regard to an English class session, the situation may seem reversed and more complex in the sense that the students, sustained by their branch of study, may be more knowledgeable about the scientific topic than their teacher who is, in reverse, more proficient in English language usage. To solve this problem, Carl-Johan et al (2009) suggest that the best way to determine the depth of intention is to let interlocutors pose precise questions to each other in order to clarify what is intended by the use of the key words.

It is clear that part of the English teacher's duty is to get help from his or her colleague teaching a scientific discipline in order to grasp the use of the scientific terms that are typical the scientific field and that he or she supposed to encounter in the English language teaching session. This is going to be developed later on when coming to identify the role that should be performed by the English teacher who intends to teach English scientific topics.

2.5.7.1.6-Text Structure and Cohesion

It has been already mentioned in the top-models of reading that prediction plays a significant role in facilitating the text's comprehension .However, our students are often encountered with scientific texts which even if they have an acceptable sum of previous knowledge about their content , they often ignore the way they are structured. For numerous reasons, expository text structures are more challenging for students than narrative structures. According to Williams et al., (2004) , this is due to the fact that most children know nothing about expository text until they start school compared with narrative text which children get used to since the time their parents started reading for them the early preschool stories. Another reason depicted lies in the fact that expository texts appear in different organisational structures as clarified by Weaver and Kintsch (1991):

1. Enumeration—a list of facts concerning a single topic.
2. Sequence—a series of events that occur over time.
3. Compare–contrast—a focus on the similarities and differences between two or more topics.
4. Classification—information organised according to categories.
5. Generalisation—one major idea contained within a few sentences.
6. Problem–solution—the statement of a problem followed by its solution.
7. Procedural description—the steps used to carry out a task.

However, Proficient readers may overcome this obstacle of the text structure ignorance by the use of other strategies that can help them to get the meaning of the text through the mastery of certain items related to the text structure itself.

First, F.L learners can benefit from the ‘title’ of the written material (book, article, or passage) because it tells them about the topic. Besides, one of the most important tools of prediction that readers can rely on to have an initial access to the text is to the use of their “prior knowledge” about the content of the text. Third, the reader can rely on the non –linguistic devices (pictures, diagrams, graphs, ect...) to understand the message of the topic. With regard to the non-linguistic devices, we will devote a part of our current description of the factors influencing reading to depict some major features that should characterise accurate pictures meant to illustrate scientific texts. Last but not least, readers can refer to use their knowledge about the context of the text to help them make predictions.

In short, Oxford dictionary (1986: 08) sums up the main elements that make up any text’s content prediction in the following list:

1. Titles and subtitles.
2. Your own background knowledge of the topic.
3. Non-linguistic context: pictures, diagrams, etc.
4. The linguistic context.

With regard to the scientific text's structure, Knowing its structure and being familiar with it, helps the students to improve comprehension to the text as that it enhances their memory and recall to its main items. Many EST scholars report that knowing the text organisation influences the text understanding. For example, Carrell (1984) has shown that texts with specific logical patterns, such as *cause-effect*, *comparison*, *contrast*, and *problem-solving*, improve recall and comprehension. Hudson (2007) also sustains this view when he states that there is an evidence for an effect of text structure on both first and second language reading comprehension in both narrative and expository texts. Alderson (1984) also ascertains in a research about the difficulty of understanding reading texts the fact that certain principles of text organisation such as cause- effect affect the recall of information. Thus, there appears an urgent need to teach the various aspects of texts structures in order to facilitate ESL reading including EST texts. Carrell (1991), for instance, claims that the awareness of text structure is analogous to awareness of reading strategies.

When trying to discuss the importance of text structure, we always refer to an important aspect which is text cohesion. Cohesion has been described in a number of ways. McCarthy (1991), for instance, defines it as any marking of surface links between clauses and sentences in a written discourse .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. Thus, cohesion can be simply defined as the way in which ideas and meanings in a text relate to each others.Halliday and Hasan (1976) identified the following cohesive ties: reference, repetition, substitution, ellipsis and conjunctions. They hold the strong view that cohesion (the semantic functions realised in the surface-level features of the text) creates coherence (the reader's understanding of the text as a coherent entity).However, Brown and Yule (1983) argue that much of the text coherence is not derived from the presence or absence of the previously mentioned cohesive ties. Thus, the effect of coherence seems stronger than that of cohesion. For Beck et al., (1991), texts that are coherent are easier to understand than texts which provide little explanation and force readers to make many connecting inferences. Once more

Halliday and Hasan (1976) argue that cohesive ties glue the sentences to form a “semantic” 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.*” One thing is sure is that the role of cohesion is undeniable when it contributes to establish clear coherent relationships between ideas of the text.

One of the English textbook drawbacks is that it supplies texts that are often adapted and modified in terms of content. However, such text adaptation does not often give importance to the degree of “damage” it could bring to the text structure. Thus, the text coherence is often affected and students, especially poor readers, get confused when being confronted with those adapted texts. In brief, it is time to think of more coherent texts’ content that would facilitate the reading task for the students and also think of reading strategies that help them identify the type of text structure used to present its content beforehand.

2.5.7. 2-Image Effect

Few studies have been devoted to contemplate the relation between print, images and reader and to discuss the integration that should exist between them. In Algeria, the quality of the textbook and the organisation of its format have a crucial issue for the Ministry of Education since the early years of the school reforms. Our main focus will be on how print and image integrate to form a well-presented scientific text that would facilitate the reading task for our students. Here we refer to print as words, image as pictures, figures or graphics and text as the layout and integration of print and image.

In this respect, two main elements of prominent importance in the construction of scientific texts are going to be highlighted: Image modality and salience.

2.5.7.2.1-Image Modality

According to Kress and Van Leeuwen (1996), modality refers to the truth-value or credibility of statements about the world .What generally determines the

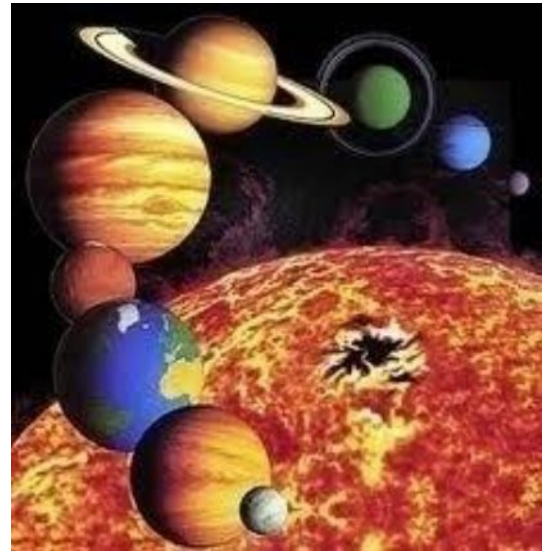
credibility of the message is the way it is presented. Pei-ling hsu and Wen-gin Yang (2006) state this clearly when they say that a photograph is more authentic and reliable than a sketch and a report-type article is more credible than a story. Within modality there is often a degree of meaning which the author seeks to express about the message's authenticity and truth. What would make the representation more authentic for the reader of scientific passages is how closely it resembles to what the naked eye sees. This is from a naturalistic perspective. According to Kress and Van Leeuwen (1996), Naturalistic modality criteria include colour saturation, colour differentiation, colour modulation, contextualisation, representation, depth, illumination, and rightness.

2.5.7.2.2-Salience

Salience means the selection of more important elements and more of attention than others. Pei-ling hsu and Wen-gin yang (2006) say about salience that it involves a hierarchy of importance and worthiness among the elements, selecting some as more important and worthy of attention than others. Kress and Van Leeuwen (1996) confirms this description of salience when they say Some elements in images have salience because of the effect of the elements ' relative size, sharpness of focus ,tonal contrast (areas of tonal contrast ,e.g., borders between black and white have high salience), colour contrasts (e.g., the contrast between strongly saturated and soft colors or the contrast between red and blue),placement in the visual field and perspective (foreground objects are more salient than the elements they overlap), and quite specific cultural factors (e.g., the appearance of a human figure or a potent cultural symbol).

The scientific passages incorporated in the secondary education third year English textbook do not seem to give much consideration to the previously described criteria of image modality and salience. If compared with other more credible representation, the illustration that would refer to the solar system (as it is mentioned in the learning situation chapter), in the third year student's New Prospect textbook is in no way highly authentic if compared with other pictures that would illustrate the

same text's ideas .The following illustration , for instance , can serve better the “Solar System” authenticity and truth because simply it incorporates most of the already talked about criteria of image authenticity and salience :



Picture 02.1: the Solar System

(Adapted from <http://starchild.gsfc.nasa.gov/docs>)

2.5.7.3-Students ‘Psychological Factors

The previous factors are related to the text and its components. However, the main element in the operation of text comprehension is the performer himself who is the student in this case. Thus, it is necessary to explore the main factors that are related to the student and that would affect the scientific text understanding. In this respect, we would like to focus on the most prominent factors that are directly related to the psychological state of the student.

First, it is necessary to state briefly some extrinsic psychological factors that can affect the reading task in general. Interest and intelligence are among the most prominent factors that are directly related to the psychological and cognitive state of the reader respectively.

2.5.7.3.1-Interest in Reading

Interest is the tendency to give selective attention to something and lack of interest is the cause of poor reading. That interest is an emotional involvement of like

or dislike which is associated with attention to some object. If the child should read, his interest must be captured. He must learn to read, his interest must be retained and he must continue to read. Appropriate reading materials must be introduced to the student that must motivate him to action. He must be invited to new interests through the ladder of suitable materials. Reading, then, must be used as a means of enjoyment, studying and thinking and a means to discover new interests.

Fleming and Stevens (1998) said about the importance of interest that in the final analysis the way to achieve progress in reading is to build on enthusiasm not only for the pleasure of imaginative (generally fiction) reading, but for unlocking the secrets of text because one wants to find out what is there. In the reality of the classroom this means suggesting more demanding, stimulating texts to be read in more sophisticated ways. Talking about interest in reading leads us to talk about the desire towards desire in reading or what is known as motivation. It is noteworthy that motivation is among the important psychological factors leading to success or failure in understanding the elements of a reading passage. It is important also to know that there are two types of motivation: intrinsic and extrinsic motivation .The former refers is related to an internal personal pleasure to satisfy one's curiosity. The latter is influenced by extraneous factors, such as when the learners feel the necessity to pass an exam, to win the prizes in a competition. Ryan and Deci (2000) point out that intrinsic motivation is defined as the desire to engage in an activity for its inherent satisfaction rather than for some separable consequences. With the regard to the different types of motivation, we trust that our students in the secondary school are much conducted by the second type of motivation which is the extrinsic one when being asked to fulfil a reading task of any type of English text. We will devote a part of our discussion to depict some of the common factors that hinder the students' motivation towards reading scientific texts in particular.

It is a crucial issue for the teacher teaching the reading comprehension skill for his learners to raise their motivation towards the reading text and seek more efficient ways to let them share the text's ideas and the author's feelings and experiences.

However, the teacher in his pursuit of winning his students' interest to the reading texts must take into a consideration another factor which may affect the reading process which is the level of intelligence of the target group of learners. Thus, the next discussion will devoted to tackle this important aspect.

2.5.7.3.2-Intelligence

Intelligence is an important determinant of reading. Harrison (2004) makes hint to the reciprocal relationship that exists between reading and intelligence when he states,

“ Reading not only increases our life skills and extends our knowledge, it goes much deeper – I want to argue that in many respects reading determines how we are able to think, that it has a fundamental effect on the development of the imagination, and thus exerts a powerful influence on the development of the emotional and moral as well as verbal intelligence and therefore on the kind of person we are capable of becoming.”

Geoff Dean (2004) states that a good reader must know that reading is a complex, intellectual endeavour, which requires him or her to draw on a range of meaning-making skills. Moreover, he states, *“Before worthwhile reading engagements can begin, the reader has to be aware that some sort of meaning will be sought – ‘the brain has to be put in gear!’”* This shows that the intellectual qualities of readers determine their capacity to understand meaning inserted between the lines of the reading passages. Since intelligence is the process of thinking, Russell (1965) made a thoughtful review of research which integrates six categories in one process of thinking: perceptual thinking, associative thinking, concept formation, problem solving, critical thinking, and creative thinking. Moreover, Reading is a complex process which involves many interactions between the reader and the text and not just bringing responses to it. Thus, we need to comprehend exactly what is actually happening what we are reading and not merely focusing on the amount of information we could get from reading a particular text which is generally referred as “the product” of reading. Irwin (1991) describes five basic comprehension processes that complement each other simultaneously: microprocesses, integrative processes,

macroprocesses, elaborative processes, and metacognitive processes. It should be noted that the five processes affect and can be affected by the students' level of intelligence and thinking. The following is a description of each of the five comprehension processes as being defined by Irwin (1991).

2.5.7.3.2.1-Microprocesses

Microprocessing refers to the reader's initial chunking of idea units within individual sentences. "*Chunking*" involves grouping words into phrases or clusters of words that carry meaning, and requires an understanding of syntax as well as vocabulary.

2.5.7.3.2.2-Integrative Processes

At this stage, the reader is supposed to go beyond items inside the sentence level. He or she is actively making connections across sentences. This process of understanding and inferring the relationships among clauses is referred to as integrative processing.

2.5.7.3.2.3-Macroprocesses

This refers to the most important purpose of reading which the memory of the text ideas. The reader tries to recall the most important ideas of the text by summarising the key ideas read. More proficient readers and comprehenders use a structure or an organisational pattern that help them to organise those ideas.

2.5.7.3.2.4-Elaborative Processes

It is the processes of making inferences beyond the points stated in the text. Those inferences may or may correspond with those intended by the author. While making inferences, we may draw on information provided earlier in the text or upon our own previous experiences.

2.5.7.3.2.5-Metacognitive Processes

Much has been said about the importance of metacognition. It is the process of thinking about thinking. It is the reader's conscious awareness or control of cognitive

processes. The reader uses a variety of metacognitive processes such as: monitoring understanding, selecting what to remember, and regulating the strategies used when reading. The metacognitive strategies the reader uses include rehearsing (i.e., repeating information to enhance recall), reviewing, underlining important words or sections of a passage, note-taking, and checking understanding.

To conclude, Kirk et al., (1978) point out that low intelligence is the cause of reading disability when appropriate educational adaptations are not made. Thus, the teacher should look for efficient strategies to evolve his or her learners' level of intelligence and thinking and work to develop the previously mentioned processes of thinking especially while dealing with texts that belong to more technical and scientific areas. Moreover, proficient readers should not suffice with running after gathering amounts of information in particular texts but rather train themselves to develop the previously correct reading processes.

2.5.7.3.3 - Attitude towards Reading Scientific Texts

The reading task remains a difficult task for many foreign language learners. The matter is worse with secondary school students who still lack motivation towards scientific texts' reading comprehension task. Various reasons lie behind this fact. Firstly, students, although their branch is scientific, do not seem interested in studying texts which would have a relation with their branch of study. This is due to the previous opinion which they held about foreign language learning as being a subject to cover only literary topics. Furthermore, the scientific texts introduced in the English books does not seem to bring anything new to them since all knowledge presented by such texts has been already dealt with in their science or biology class. Hence, encountering the same information for more than once would render it boring and trivial even if it is presented in a different language. One more important element is the importance of context in understanding scientific texts. Martins and Veiga (2001: 69) have also highlighted the importance of context in understanding concept formation when they stated that scientific knowledge is frequently viewed as independent of the context, because it is supposed to be valid for any situation. However, an increasing

number of authors argue that science teaching must be organised around situations close to real scientific knowledge. They argued that decontextualising science from the site of its use uproots scientific knowledge from its natural source, resulting in disengagement of the learner.

The decontextualisation of texts is a feature of scientific texts which are introduced in the English textbooks since in fact they are just extracts or passages that belong to large bodies of scientific units which represent the real background to them. Thus, they are uprooted of their actual context to be dealt with as mere examples of scientific expository scientific reading passages. This contributes as it has been already mentioned in the disengagement of the student and makes him or her uninterested in the subject matter.

2.5.7.3.4-Conceptual Change and Prior Knowledge

It is commonly known that students in the learning stage develop different strategies to learn new concepts every day. Vygotsky (1962) recognised these concepts as being naïve. Naïve concepts are based on everyday experiences and scientific concepts belong to a different specific conceptual system. Vygotsky (1962) identified a gap between the two systems and claimed that combining the two demands some rearrangement of the learners' existing knowledge structures. The school teaching methods seem to ignore this practical problem that faces the students when coming to learn new scientific concepts. The problem lays in the fact that the textbooks offer a ready-made knowledge that does not give consideration to students' mental model which they would have about the target topic. These textbooks present scientific models as if the learners have no prior knowledge relevant to the topic to be learned. Thus, it should be recognised that the students come to school with naïve concepts about certain scientific facts that is quite different from the actual relevant scientific knowledge dealt with in school. This is actually known as conceptual change. Vosniadou (1998) illustrates this point by taking photosynthesis – one of the most important concepts in the biology curriculum – as an example of conceptual change. After instruction, children often manage to show that they have learned some

characteristics of the scientific model of photosynthesis on a superficial level. But when children are asked to explain photosynthesis, they reveal in their explanations that they assimilate parts of the new scientific model into their naïve model. Children might, for instance, confuse the new concepts with their old ideas. Thus, they might think that plants take in sun, rain, light, soil or minerals, which then gives them energy to live. Herein lies the problem of science teaching; how to help the learners to see the differences and similarities in their own thinking and the presented scientific model. The final aim of the teacher is to make the scientific model more accessible when the naïve model seems to predominate the learner's thinking.

From all what have been explained, it is evident that the role of the English teacher is crucial in the selection and adaptation of scientific texts to suit the learners' mental models. What other factors are related to the role of teacher in teaching scientific texts, this is what is going to be tackled in the forthcoming presentation.

2.5.7.4-Teacher's Related Factors

Many English teachers complain that they face real difficulties to teach scientific texts to their students. They say that they lack the appropriate knowledge to explain certain natural facts and scientific phenomena since in all cases it is not an English teacher's discipline, but it is the discipline of the science teacher that they are dealing with. Thus, the only way the English teacher seeks is to get help from the colleague science teacher who could help him or her explaining the difficult scientific concept encountered in the English scientific texts.

In fact, with the science teacher, science is taught as a discipline; whereas with the teacher of English, or let us say the EST teacher, science is taught as a subject. Widdowson (1979) provides an explanation that distinguishes between teaching science in both content areas. He states,

“The science teacher's discipline task is to develop teaching techniques and materials which will guide his students to acquire knowledge of this system. In other words, the principles of the discipline are pedagogically processed to fashion a subject

for teaching. The teacher of EST is not generally called upon to teach the English discourse of science as a discipline, but the English discourse of science as a subject.”

Widdowson(1979) insists on the fact that the EST teacher is really in need to know something about the pedagogy of science as a subject although he may find it of interest to investigate the philosophy of science as a discipline.Widdowson supports his view by telling that success in integrating the two areas of knowledge is plainly related to how closer the English teacher’s methodology can be made approximate to that of science teaching. He concludes that their synthesis constitutes relevant English use. Moreover, Widdowson puts clear that the students will have already acquired some knowledge of the communicative systems of science in scientific subjects. Therefore, according to Widdowson, the real task of the English teacher is not to develop this knowledge but to demonstrate how it is realised through the medium of a different language. Widdowson’s operational view to achieve this task is based on certain assumptions related to the knowledge of both the English language usage and the language use in scientific discourse .He presumes that the student is supposed to acquire the knowledge of both languages in the secondary schooling. The task of the English teacher is to relate these kinds of knowledge to convert usage into use by means of the student’s existing communicative competence in his own language. Thus, the objective of the English teacher is to change the concept of English learning as being a set of grammatical rules to transfer it to a medium that would enable him to expose his communicative competence already acquired in the scientific discipline .In brief, the students should feel that they are involved in a communicative activity and not a language exercise. Thus, the English teacher should devise tasks where students feel that they are solving a problem in science. Indeed, it is an exploitation of a science teaching methodology. In this respect, Widdowson (1979) states,

”I believe that the teacher of EST would be best advised to seek methodological guidance not from the linguist or the philosopher of science, but from the science teacher. His best source of reference is likely to be textbooks of science and the experience of his teaching colleagues.”

It is evident that Widdowson's view about EST teaching favours the communicative aspects of language learning upon merely focusing just on the language usage features. According to him, EST is primarily concerned with the teaching of use rather than just surface structural language aspects. His message to all EST teachers who still worry about their students' language usage mistakes is that encouraging use practice will lead to usage correctness.

2.6-Conclusion

In this section we tried to discuss some major features and definitions related to the teaching of the reading skill in general. We also aimed at having a look on some ESP major concepts and relevant components with the aim of setting an appropriate background for the forth coming part of this chapter which was devoted to highlight and analyse the main factors that contribute to the reading task difficulty of texts belonging to one major field of ESP which is EST and more precisely the English scientific texts reading comprehension. As it has been exposed, the focus was on three main factors: The linguistic factors, the student's related factors and the factors related to the teacher. Such factors were depicted in this chapter at the theoretical level. The next chapter will represent the practical side of our study and our main concern in it will be either to prove or deny partly or fully the existence of the earlier discussed factors that hinder the reading ability of our students of the English scientific texts in the secondary school.

Chapter 03:

The Field Work and Data Analysis

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3.1-Introduction

This chapter represents the practical side of our thesis. It is mainly concerned with investigating some of the issues that are dealt with in this study. These issues cover mainly the major factors that influence the English scientific texts and contribute to their reading difficulty among the third year secondary school scientific students. As it has already been described in the learning situation chapter, three main tools were used to uncover those reading difficulties: a questionnaire to the students, a questionnaire to the teachers and observation sheet concerning a reading session attended with the target group of students. The students' questionnaire aims at detecting the main difficulties that the students face while reading English scientific texts and discover their attitude towards that type of text (see appendix 1). The questionnaire administered to the teacher focuses mainly on the methodology of teaching practised with the English scientific texts and also it aims to uncover the main obstacles that encounter both the teacher and the students while dealing with English scientific texts (see appendix 2). The third tool which is observation has primarily the purpose of getting closed to both the students and the teacher while being involved in an English scientific reading session to observe and identify the major aspects and the prominent teaching learning landmarks characterising the target reading session see appendix 3).

3.2-Population, Sampling, and Randomisation

The study is conducted at the Secondary School of Mohamed Boudiaf, the researcher's current place of teaching, which is situated in Mediouna; the researcher's home town. This research has been confined with the third year science students mainly for two reasons:

1-They have encountered scientific passages in their English textbooks mainly for two years.

2-Being of scientific branch may motivate them more to take part of the current research and let them know about their real problems in reading science texts written in English.

Other information concerning the target group of students is already stated in the learning situation chapter.

3.3-Students' Questionnaire:

3.3.1-The Purpose of the Students' Questionnaire

The main objective of the questionnaire is to detect the main difficulties that the students face while reading English scientific texts.

3.3.2-Administration of the Questionnaire

The questionnaire has been administered to students at the end of the third term of the academic year 2010/2011.

3.3.3-Organisation of the Questionnaire

The questionnaire consists mainly of a number of multiple choice questions (MCQ) where the students have just to put a cross in the right box (sometimes, yes, no). These questions are classified into four distinctive categories:

- Learning skills
- Reading skill strategies
- Reading scientific texts
- Student's psychology

3.3.4-Analysis of the Results

3.3.4.1-Learning skills

Question 1

The aim of this question was to know the prominent learning skill(s) that the students consider as important skill(s) to succeed in English language learning.

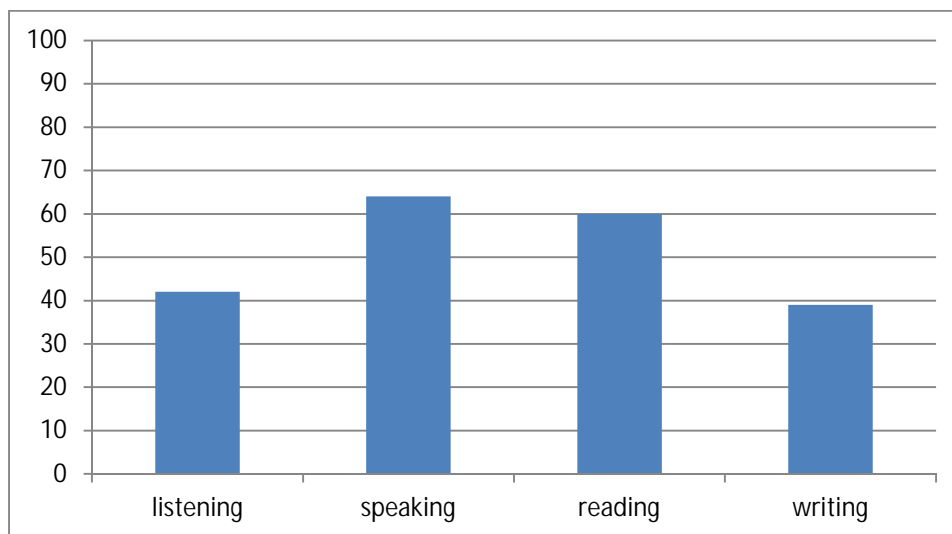


Figure 3.1: Learning Skills and English Success

The illustration above shows that the students share a common belief that to reach an acceptable standard level in English you need to be able to speak it first (64%). This does not deny that reading has almost the same degree of importance according to the illustrated students' views (60%).

Question 2

The aim of this question was to know the major learning skill(s) that the students consider as important in their success in English school exams.

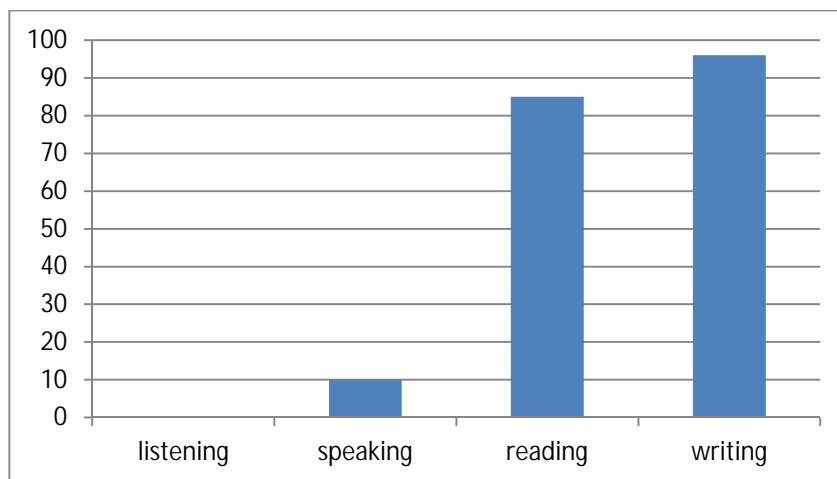


Figure 3.2: Learning Skills and School Exams' English success

Compared to the first illustration, the second graph shows that to succeed in an English school exam, 85% of the students are convinced that they need to focus mainly on the reading skill.

3.3.4.2-Reading Skill Strategies

Question 3

The aim of this question is to detect the actual reading strategies that the students use to understand English texts in general.

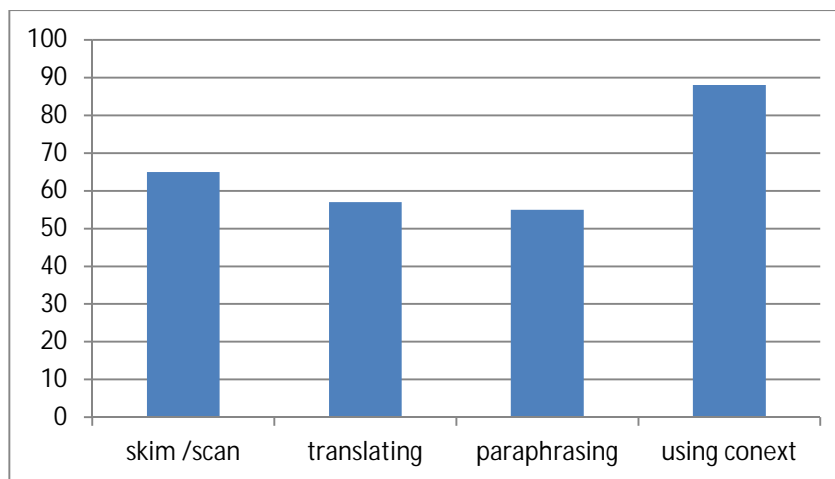


Figure3.3: the Reading Strategies Used to Understand English Texts.

With regard to the rates of the students' responses, it should be mentioned that some students crossed more than one strategy. That is why the accumulation of all students' responses in the figure 3.3 gives a rate which is more than 100%. As Figure 3.3 depicts, 88% of the students stated that they used context to find text meaning. This involves that this group of students has developed a certain cognitive ability to deduce the meaning of unfamiliar words by referring to the neighbouring words and phrases that readers know. In this case we would also refer to another component of Irwin's (1991) basic comprehension processes which are the integrative processes. Another important group of students (65%) admitted that they use skimming and scanning as a strategy while they read English texts. The detection of these two useful strategies as being important strategies used by the students to read English texts in general gives, in fact, an encouraging impression that they are disposed of two of the most adequate and effective current reading strategies and have developed a positive attitude towards their use. With regard to the other two reading strategies, 57% of the students responded that they resort to the translation of the text lexis into Arabic or French in order to get its meaning and 55% of them admitted that they paraphrase the text ideas using their own style to reproduce the text again keeping its main ideas of course. Concerning the translation into Arabic or French, it is clear that the students focus more on the single words' meaning of the text rather than using other strategies to understand the English discourse as a whole. Thus, it is the bottom-up reading model which students often rely on in order to understand English texts.

With regard to paraphrasing, it is certain that one prominent group of students (55%) has succeeded to develop one of what Irwin (1991) named earlier in the basic comprehension processes which is the macroprocesses.

3.3.4.3--Reading Scientific Texts

Question 4

The aim of this question was to know whether students like reading English texts of scientific topics or not.

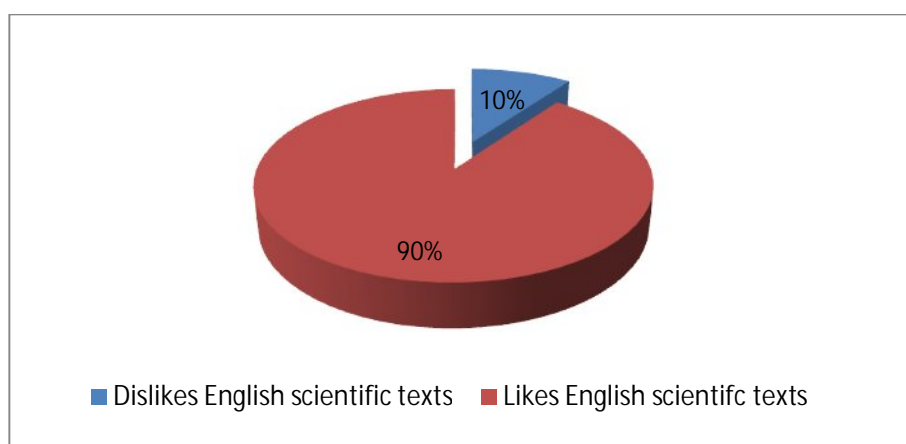


Figure 3.4: Likes and Dislikes of Scientific Texts

It is apparent that a big number of students (90%) have got a positive attitude towards English scientific text's reading. This is due partly to its direct relation with their branch of study. This positive attitude should, normally, raise the students' motivation to study English in general. However, in our attendance with the class of the target group of students we noticed, as it will be depicted in the observation sheet later, that the majority of students did not show any motivation to study English, let alone reading English texts of scientific topics.

Question 5

The aim of this question was to know which branch of science students favour most.

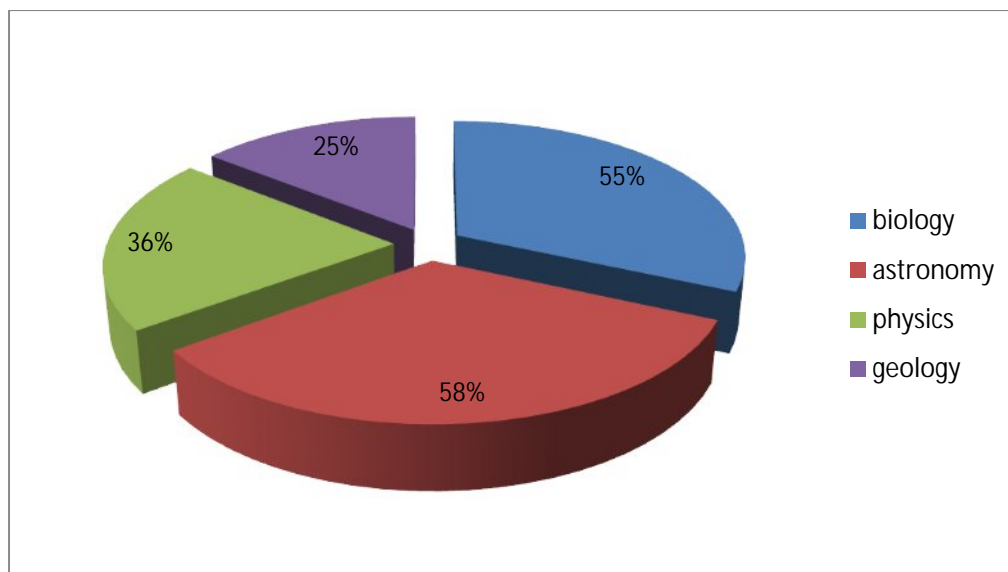


Figure 3.5: Favourite Science Branches

First, with regard to the rates (percentages) mentioned in figure 3.5, it should be noted that some students have chosen more than one choice of branch of science. That is why one added to one another, the depicted rates give a result which is more than (100%). Next, the aim of this question is to know which branch of science makes the students more attracted to science and also raise their attention to some other existing branches of science.

According to the results in figure 3.5, an important number of students (58%) showed a more apparent interest to study astronomy. This can be explained by the fact that astronomy is the current encountered subject in the students' English textbook. That's why they have a predisposition to study it.

Biology ranked secondly after astronomy with regard to students' most favourite science branches when 55% of them showed their interest to study it. This can be explained by the fact that biology is a dynamic subject which most students like to study and encountering it in English sessions will make it more motivating.

Compared to biology, more number of students (55%) showed a common interest to study astronomy while dealt with in English. This can be explained by the

fact that astronomy is the current encountered subject in the students' English textbook. That's why they have a predisposition to study it.

Compared to astronomy and biology, less number of students (36%) does not seem to have interest to read English texts that deal with physics. This is also due to their basic weakness in physics while dealt with as an independent subject .Thus; they have a psychological anxiety towards it.

Just like physics, geology has not received great level of interest from the part students (25%).This also can be attributed to their lack of motivation towards geology while studied in science sessions.

Question 6

The aim of this question was to know to what extent English scientific texts are more or less difficult compared to general English texts.

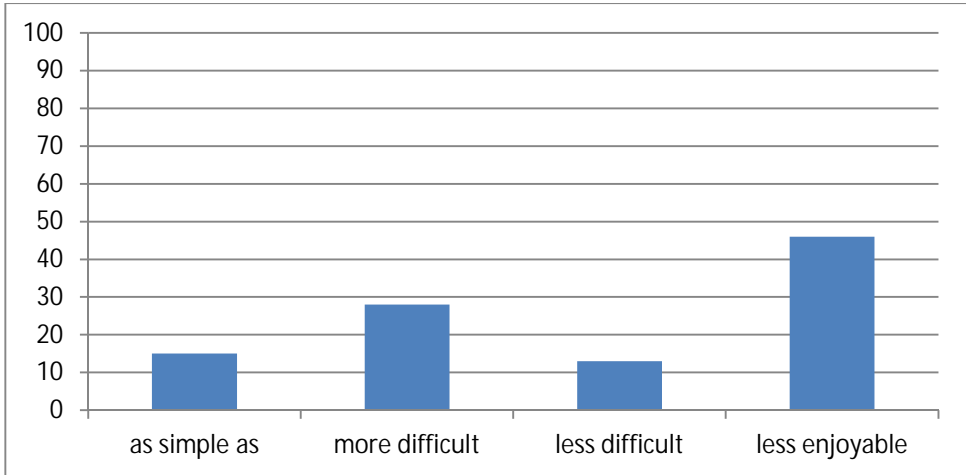


Figure 3.6: Comparing English Scientific Texts to General English Texts.

It should be known again that some students mentioned no opinion concerning their opinion towards drawing a comparison between English scientific texts and general English texts.

It can be noticed, as being clarified in figure 3.6, that an interesting number of the students (46%) stated that the English scientific texts are less enjoyable as compared to general English texts. This goes on contrary to the students' opinions in figure 3.4 where most students expressed their attraction to English scientific texts. In fact, it is the inclusion of general English which influenced the degree of motivation towards scientific texts. In other words, general English texts won much of the students' motivation due to the easy known structure of the narrative texts to the students since they have already been used to since their first days in school though in different languages. This similar structure is identified by a recognisable plot of events (characters, setting, problem, action, conclusion, moral). However, they have never been trained to identify the scientific texts' different structures in order to have an easy access to its content. With regard to the degree of difficulty, an apparent number of students (28%) stated that they face more difficulties to understand scientific texts. This can be attributed to the difficult vocabulary and the complex sentence structure that characterise this type of texts as compared to other English narrative texts.

Question 7

The aim of this question was to detect what aspect(s) cause(s) major problems to the students while reading English scientific texts

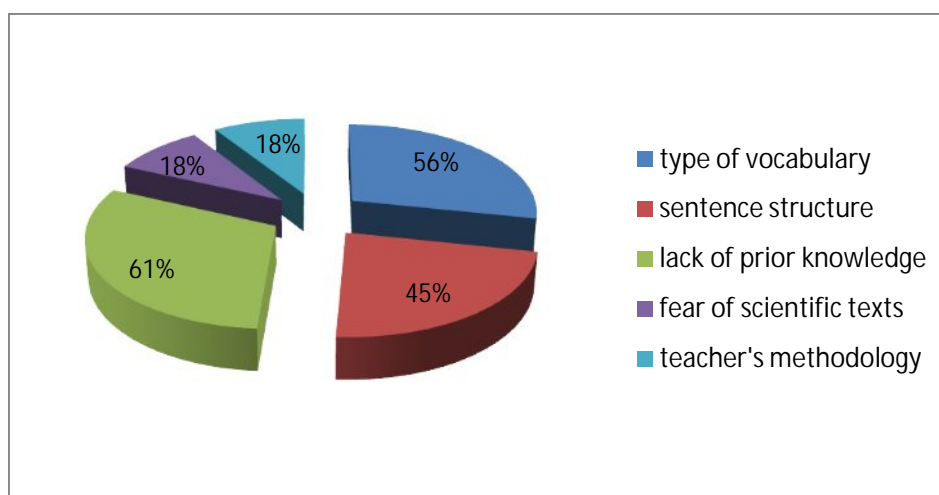


Figure 3.7: Type(s) of Difficulty

Here again it should be mentioned that some students crossed more than one choice concerning the suggested reading obstacles. According to the results of figure 3.7, the students' responses were distributed among three large slices that are attributed respectively to three types of difficulties that encounter students while reading English scientific texts. These are as follows: the lack of prior knowledge (61%), the type of vocabulary (56%) and the sentence structure (45%). With regard to the lack of prior knowledge, the students confirmed that having no prior information about the content of the text let alone its structure leads them to be caught in a state of ambiguity and confusion. Concerning the type of vocabulary, the students stated that the technical vocabulary encountered in English science texts presents one of the major difficulties that hinder their ability to understand such type of texts. This includes their weakness to identify both technical and the sub-technical vocabulary. Besides, the students stated that one of their major problems to decode English scientific texts' meaning is owed to the sentence structure that characterises this type of texts. This includes mainly heavy loaded subjects and objects. With regard to the other two suggested obstacles which are the fear of scientific texts and the teacher's methodology, small number of students (18% for each suggested difficulty) said they these two difficulties create actual problems for them to read English scientific texts. The state of having no fear among a large body of students towards scientific texts is partly attributed to the fact that they have been already accustomed to such type of information in the other scientific disciplines related to their school subjects. With regard to the teacher's methodology, students at such a level and situation cannot really evaluate their teacher's methodology since they have not really trained on another alternative and a more effective reading method which can help them to judge the current teaching method.

Question 8

The aim of this question was to know the real aspects that hinder the students' abilities to understand scientific vocabulary.

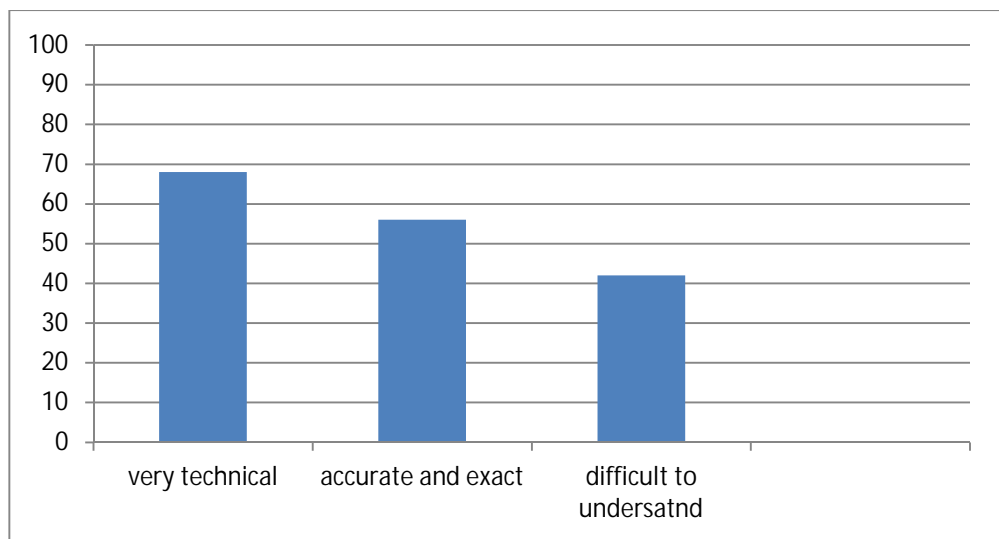


Figure 3.8: English Scientific Vocabulary Tough Features

Here again the students crossed more than scientific vocabulary feature. As it is portrayed in figure 3.8, a remarkable number of students (68%) confirm that the type of vocabulary encountered in English scientific texts is very technical. This partly explains their previous depicted problem to decode the meaning of such kind of lexis. With regard to the degree of accuracy and exactness of scientific vocabulary, another apparent number of the questioned students (56%) admitted that the scientific lexis has conspicuous features of exactness and accuracy. As it has already explained in the previous chapter, with such features of exactness and accuracy the low student or let us say the novice requires more a high degree of intention depth that would enable him or her to communicate in a more proficient way with his or her science teacher let alone communicating the same exact and accurate scientific terms with the English teacher. The lack of this depth of intention among our students leads them simply to fail to grasp the meaning of most scientific terms encountered in their English textbooks. Concerning the expected difficulty of scientific vocabulary, a rather important number of students (42%) stated that they face difficulties to understand the scientific vocabulary. As it has already been mentioned, this is due to some aspects that characterise the scientific lexis in general. Among these aspects we can state, for instance, the students' ignorance of the process of nominalisation.

Question 9

The aim of this question was to know whether students use context to understand the lexis encountered in English scientific texts or not.

Sometimes	Yes	No
29 %	66%	3%

Table 3.1: Understanding Scientific Lexis in its Context

According to the results in table 3.1, one of the main strategies that a big number of students (66%) resort to in order to understand the English scientific text's incorporated scientific vocabulary is the use of context .This gives an encouraging impression that the students can develop certain effective strategies to guess meaning of certain scientific terms.

Question 10

The aim of this question was to detect whether students can depict any difference between Reading scientific texts in English and science or not.

Sometimes	Yes	No
29 %	66%	3%

Table 3.2: Scientific Texts' Depicted Difference between Science and English

Only 3% of the respondents deny that difference existing between encountering scientific texts in English textbooks and reading those texts in science textbooks. This leads us to wonder about the major cause of this depicted difference. The following results in table 3.3 may give explanation to that fact.

Question 11

The aim of this question was to discover what sort of differences students can find between reading scientific texts in English and dealing with in science sessions. Dealing with them in English is ...

	Sometimes	Yes	No
More motivating	30%	26%	7%
Less enjoyable	26%	22%	37%
More difficult	26%	15%	22%

Table 3.3: Distinctive Aspects of Scientific Texts in English and Science

The largest rates in table 3.3 such 30% who admitted that scientific texts are more motivating for them and 37% who similarly denied that scientific texts are less enjoyable when encountered in the English textbook denote a surprising deduction. We expected that the decontextualisation of scientific texts from their natural source which science will automatically lead to the disengagement of the learners to read these texts when being written in English. However, the English language motivated more the students to read those scientific texts since they are interested to know their latent abilities to decode meaning of science texts when being expressed in English which is, at least in the mind of the students, considered as one of the most important current languages through which modern science is expressed.

Question 12

The aim of this question was to know to what extent students are aware of their English teacher's adaptation to the selected English scientific text.

Sometimes	Yes	No
55 %	41%	4%

Table 3.4: The English Teacher's Adaptation of Selected Scientific Text

According to the results in table3.4, the English teacher of the student's group does not hesitate to adapt or even supply other scientific texts apart from those in selected in their English textbook. This was confirmed when we attended the observation session with the target group of students where their teacher supplied them with handouts about a text that talked about the solar system (see appendix 4). Part of the students' motivation, already highlighted, towards English scientific texts is

attributed to the ability of the teacher to select texts that suit their level and their motivation.

Question 13

The aim of this question was to know whether the selected texts suit the students' level and interest or not.

Sometimes	Yes	No
40 %	29%	19%

Table 3.5: the Suitability of English Scientific Texts

It seems clear that more responses (40% and 29%) denote that many students are at ease with the kind of the English scientific texts that their teacher selects to be dealt with in the English reading sessions. This refers to texts that carry easy known lexis, simple structures of sentences and clear illustrations.

Question 14

The aim of this question was to confirm the role that is played by illustrations to help students understand English scientific texts.

Sometimes	Yes	No
11%	89%	00%

Table 3.6: the Role of Illustrations

It is evident that the majority of the informants (89%) agree on the effective role that the illustrations could achieve in order to help them understand English scientific texts .This includes maps, graphs diagrams and even pictures.

Question 15

The aim of this question was to know to what extent students agree on the well-

presentation of the English scientific texts' illustrations inserted in the English textbook.

Sometimes	Yes	No
60%	34%	6%

Table 3.7: The Illustrations' Presentation in the English Textbook

With regard to the way the English scientific texts 'illustrations are presented in the English textbook, more students (60%) state that they sometimes find them not very helpful. That is to say, such illustrations often need some clarity in order to fulfil their real task of making the target texts appear more accessible for the students.

3.3.4.4-Students' Psychology

The aim of this part of questions is to depict the actual students' psychological state towards reading English scientific texts.

	Sometimes	Yes	No
1-Do you enjoy reading scientific Texts written in English?	45%	39%	16%
2-Is there fun and humour in reading English scientific texts?	19%	00%	81%
3-Do you find Scientific English texts boring?	33%	15%	52%
4-Do you find them interesting?	30%	66%	4%
5-Do you find them free from all kinds of emotions that are sometimes encountered in literary texts?	26%	66%	8%
6-Do you like the direct style of scientific texts?	11%	81%	8%
7-Do English scientific texts add something to your former scientific knowledge?	7%	85%	8%

Table 3.8: Students' Psychology towards English Scientific Text's Reading

The results in table 3.8 clarify many important facts about the students' psychological attitude towards English scientific texts reading. At any rate, the informants seem to hold a positive attitude towards reading English scientific texts.

Although a big number of them (66%) admits that such type of texts lack many of the emotional aspects usually encountered in other literary texts, this does not prevent them from getting attracted by the direct style of scientific texts (81%). What ascertains this fact is that most students (85%) share one common truth which is that reading such type of texts would enrich their former scientific knowledge. Naturally, this a direct consequence of the students' love and admiration to read more about topics and texts written in English that have a close relation with their branch of study which is science. Otherwise, one would not be able to memorise the target texts' ideas unless there is a certain feeling of acceptance and relaxation while reading such type of texts.

To conclude, the results reveal that the students' attitude towards reading English scientific is positive and encouraging. As it has been depicted, a great deal of this positive admiration and acceptance to deal with such type of texts is related to varied factors. Among these factors we can state, for instance, the English language itself. That is to say, the students are very motivated to read scientific information whenever being encountered written in English. Moreover, The English teacher's methodology in presenting scientific texts seems to play a significant role in getting the students attracted to read them .The teacher's methodology can include , for example , the ability to select , adapt and modify scientific texts that would suit his learners' level and interests. However, there are other obstacles that prevent the students from having an easy access to understanding English scientific texts. First of these obstacles is the lack of prior knowledge to scientific texts' content and even their ignorance to the different scientific texts' structures. The second obstacle is related to the difficult scientific lexis which incorporates technical and sub-technical vocabulary, lexical and grammatical metaphors and the nominalisation process. Moreover, the students' real problems are related to complex sentence structure that characterises the scientific discourse. This includes mainly the heavy loaded subjects and objects. Lastly, the illustrations inserted in the English textbook such as pictures, graphs , diagrams , ect... are supposed to facilitate and clarify the target scientific texts meant for reading by the students. However, such illustrations lack much techniques of

presentation accessories .Thus, pictures, for instance, encountered in scientific texts are by no means authentic because they lack such meticulous techniques as image modality and salience. Students, therefore, expressed their dissatisfaction towards these illustrations by stating, simply, that they are not very helpful.

3.4-The Teachers' Questionnaire

3.4.1- The Purpose of the Questionnaire

The teacher's questionnaire main purpose is to reveal mainly the methodology of teaching practised with the English scientific texts and also aims to uncover the main obstacles that encounter both the teacher and the students while dealing with English scientific texts.

3.4.2- Time of Administration

The questionnaire was administered to a group of seven secondary school teachers of English by the end of the third school term of the academic year2010/2011.

3.4.3- The Teachers' Degree

All the seven teachers to whom the questionnaire was administered have a B.A.degree in English and have either taught or been currently teaching the 3rd year level of secondary school scientific branch students.

3.4.4-The Organisation of the Questionnaire

The questionnaire comprises a number of MCQ (multiple choice questions) divided into three main categories:

- learning skills
- pedagogy
- students' affective and cognitive state

The teachers are asked to put a cross in the right box (sometimes, yes, no)

3.4.5-Analysis of the Results

3.4.5.1- Learning Skills

Question 1

The aim of this question is to portray the learning skill(s) that are mostly covered by the 3rd year English textbook.

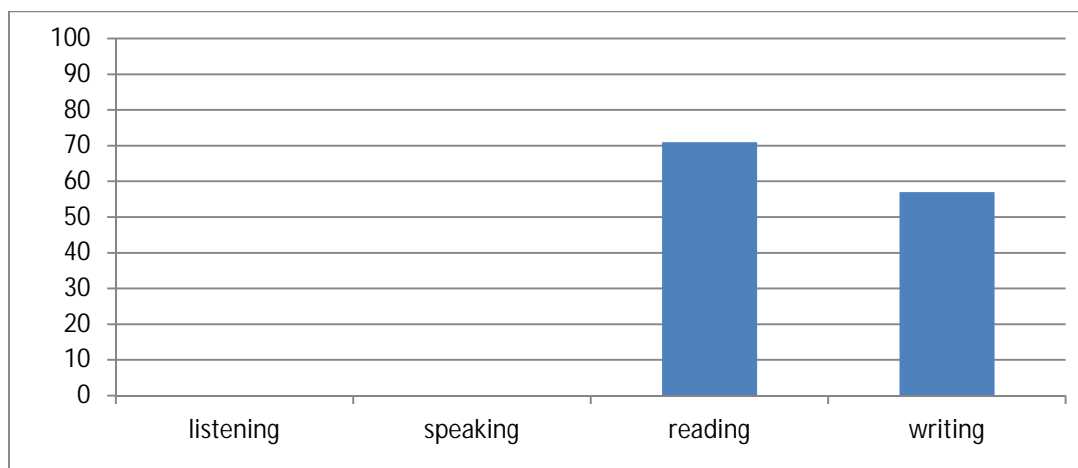


Figure 3.9: The Mostly Covered Skill(s) by the English Textbook

As it is clearly shown in figure 3.9, reading is the mostly covered skill by the 3rd year English textbook. This means that more importance is given to the reading skill in favour of the other skills. It is important to study an area of knowledge that belongs to a learning skill, which is reading in this case, that is widely covered by the English textbook.

3.4.5.2- Pedagogy

Question 2

The aim of this question is to depict to what extent the new programme is suitable to the students' level.

Sometimes	Yes	No
42%	29%	29%

Table 3.9: The Suitability of the New Programme to the Students' Level

It is clearly noticed from the results in table 3.9 that the major opinions of the questioned teachers share a common belief that new programme fits their students' level. However, another group of teachers, though being minor (29%), still consider

that some tasks incorporated in the syllabus are difficult and beyond their students' level.

Question 3

The aim of this question is to know whether the English textbook incorporates texts of scientific topics or not.

Sometimes	Yes	No
29%	71%	00%

Table 3.10: The English Textbook Scientific Texts' Incorporation

All teachers agree that the third year English textbook includes some units whose content is typically scientific. This encourages us to know their opinion about the inclusion of the scientific texts in the English textbook.

Question 4

The aim of this question is discover the degree of similitude between General English and English scientific texts' lesson plans set out by the English teachers.

Sometimes	Yes	No
57%	29%	14%

Table 3.11: Expected Similarity between General English and English Scientific Texts' Lesson Plans

According to the results in table 3.11, It's apparent that more teachers do not often (57% and 29%) implement on their usual lesson plans meant for General English reading texts to set up appropriate lesson plans that are typical and more adequate to English scientific texts .This seems natural since whether in narrative texts or scientific texts the focus is on reading as a "product "and not reading as a "process".

Question 5

The aim of this question is to know whether the teachers of English set out typical scientific texts' activities or not.

Sometimes	Yes	No
28%	57%	14%

Table 3.12: Setting Typical Scientific Texts' Activities

It is worth mentioning that appropriate scientific texts' activities are those which focus mainly on the process of thinking which is suitable for all kinds of texts. However, the teachers' responses in table 3.12 refer mainly to the activities that tend to carry certain typical reading product instruction such; completing a table, drawing a diagram, organising a process ect.... Still to mention that for our teachers the texts' type does not determine the kind of activities selected for those texts and, thus, most teachers (57% and 28%) often select the same kind of activities for all kind of texts.

Question 6

The aim of this question is to know whether the teachers of English use scientific tools (charts, maps, graphs, maps, pictures, ect..) to clarify meanings in scientific texts or not.

Sometimes	Yes	No
85%	15%	00%

Table 3.13: Use of Scientific Tools

It is evident that most teachers (85% and 15%) often resort to use a range of scientific tools such as ; charts , maps , pictures , tables and graphs to explain sorts of information encountered in scientific texts. This to facilitate the reading tasks for the students.

Question 7

The aim of this question is to check the teachers' awareness of the importance of scientific tools' use to reach a better English scientific texts' understanding.

Sometimes	Yes	No
29%	71 %	00%

Table 3.14: The Importance of Scientific Tools

According to the results in table 3.14, all questioned teachers agree that using scientific tools such as ; charts , maps pictures ect... to illustrate scientific information in the target reading passages help their students reach a better understanding of those scientific texts.

Question 8

The aim of this question is to know whether teachers face difficulties while dealing with English scientific texts or not.

Sometimes	Yes	No
71%	29%	%

Table 3.15: Facing Difficulties while Dealing with English Scientific Texts

It is clear that from the teachers' responses in table 3.15 that dealing with scientific texts presents some difficulties for them. Thus, one would wonder about the type of difficulties that the English teachers face while dealing with scientific texts.

Question 9

The aim of this question is to detect the kinds of difficulties that teachers can find while dealing with English scientific texts.

	Sometimes	Yes	No
Teacher's lack of scientific knowledge	100%	00%	00%
The weak level of the students	29%	71%	00%
The students' lack of interest in English lessons	15%	85%	00%
The students' lack of interest in English scientific texts	71%	29%	00%
The high technicality of scientific vocabulary	57%	43%	00%

Table 3.16: Teacher's Types of Difficulties while Dealing with Scientific Texts

Results of table 3.16 portray clearly the type of difficulties that the English teachers face while dealing with scientific texts. One prominent obstacle(100%) is their customary lack of knowledge related to scientific topics Moreover, more teachers (71%) claim that their students' weak level in English in general contribute to the difficulty they face while dealing with scientific texts .With regard to the students' lack of interest to study English and to deal with English scientific texts in particular, 85% of the questioned teachers insist that it is one the main obstacles that hinder their relentless efforts in facilitating the reading task of English scientific texts for their students. To end up with, part of the difficulties they face with English scientific texts is partly owed to the complex technical vocabulary that sometimes characterises those sorts of texts.

Question 10

The aim of this question is to know the English teachers' tendency to adapt English scientific texts.

Sometimes	Yes	No
29 %	71%	00 %

Table 3.17: Adapting English Scientific Texts

It is evident that most teachers of English under investigation take the initiative to adapt the English scientific texts before coming to be dealt with in the reading sessions. Of course it is not just adapting textbook passages, but they also try to select

other texts apart from those inserted in the English textbook. Naturally, this a direct consequence of the teachers' awareness that some selected texts in the textbook do not really suit their students' level and motivation .However, one important fact we still want to wonder is to what extent are teachers aware about the techniques of adapting texts. Thus, for instance, they should take into consideration the quality of keeping the text' structure intact and undamaged.

Question 11

The aim of this question is to know whether English teachers ask for help from a science teacher to teach scientific knowledge or not.

Sometimes	Yes	No
57%	43%	00%

Table 3.18: Seeking Help from a Science Teacher

According to the results in table 3.18, all questioned teachers (57% and 43%) agree that it is important to ask help from a colleague teacher teaching a scientific discipline in their preparation for reading lessons dealing scientific texts. This help may incorporate the explanation of some scientific concept and major technical items encountered in the target English scientific texts. This asserts Widdowson's (1979) view when he states that the best advisor and guide to the EST teacher is the teacher of science.

Question 12

The aim of this question is to know whether English teachers are used to attending seminars relevant to scientific texts' reading comprehension.

Sometimes	Yes	No
14%	28%	58%

Table 3.19: Attending Seminars Relevant to Scientific Texts' Reading Comprehension

The results in table 3.19 make it clear that more teachers (58%) deny their participation or attendance in seminars that aim to train the teachers about the teaching methods and the major techniques that should be used while dealing with reading comprehension related to scientific texts. This lack of training explains from one part the teachers’ “handicap” towards acquiring an effective proficient teaching method for such type of texts.

Question 13

The aim of this question is the degree of teachers’ motivation towards English scientific texts

Sometimes	Yes	No
72%	14%	14%

Table 3.20: Scientific Texts and the Teachers’ Motivation

It is evident that a big number (72%) of the questioned teachers admit that scientific texts are motivating for them .This is, indeed, an encouraging fact in the sense that motivation increases the teacher’ s enthusiasm and lead him or her to a positive performance while being involved in reading comprehension sessions dealing scientific texts.

3.4.5.3- Students’ Affective and Cognitive State

Question 14

The aim of this question is to know the teachers’ opinion about their students’ motivation towards English scientific texts.

Sometimes	Yes	No
58%	14%	28%

Table 3.21: Scientific Texts and Students’ Motivation

The rates in table 3.21 depict clearly that more teachers (58%) are certain of their students' motivation towards English scientific texts. This confirms the previously revealed students' interest in reading scientific texts when encountered in their English textbook.

Question 15

The aim of this question is to know the teachers' opinion about their students' detected fear towards scientific texts.

Sometimes	Yes	No
72%	14%	14%

Table 3.22: Students' Fear towards Scientific Texts

It has already been shown that the students hold little fear towards reading scientific texts written in English. Similarly, the teachers' views in table 3.22 ascertain this fact. As it has already been explained, this is partly attributed to the students' branch of study which provides them with certain background knowledge to study this type of text.

Question 16

The aim of this question is to know the teachers' opinion about their students' spent time with English scientific texts' reading tasks as compared with other general English reading tasks.

Sometimes	Yes	No
28%	00%	72%

Table 3.23: The Students' Spent Time with English Scientific Texts' Reading Tasks

According to the results in table 3.23, most teachers (72%) state plainly that the time that their students spend with the reading tasks related to scientific texts is not less than that spent with reading tasks related to other type of texts. This tells that the

students encounter similar problems if not more with English scientific texts' related tasks.

Question 17

The aim of this question is to know the teachers' opinion about their students' estimated hard attempts to grasp scientific concepts.

Sometimes	Yes	No
43%	57%	00%

Table 3.24: The students' Estimated Attempts to Grasp Scientific Concepts

The expressed views in table 3.24 confirm the expectations of the great difficulties that face our students while dealing with English scientific texts. However; one should wonder about the type of these reading difficulties.

Question 18

The aim of this question is to know the teachers' opinion of type of reading difficulties that their students encounter while reading English scientific texts.

	Sometimes	Yes	No
The students' lack of prior knowledge	43%	57%	00%
The technical scientific vocabulary	57%	43%	00%
Complex structure of scientific text sentences	72%	28%	00%

Table 3.25: Types of Reading Difficulties

According to the results of table 3.25, most teachers (72%) view that the complex structure of the scientific texts' sentences and their lack of prior knowledge represent major difficulties to their students in order to understand scientific texts. Moreover, the technical scientific vocabulary, though with less degree (57%), are also considered among the major "handicaps" that impede the students' understanding to English scientific texts. These facts confirm the students' previously expressed views concerned the English scientific texts' reading difficulties.

Question 19

The aim of this question is to know the teachers' opinion about their students' estimated desire to understand difficult scientific terms.

Sometimes	Yes	No
57%	43%	00%

Table 3.26: Students' Desire to Understand Difficult Scientific Terms

The results in table 3.26 show clearly the students' well-determined tendency to seek explanations of some difficult scientific lexis from the part of their English teachers. This confirms the difficulty these students face when they often encounter complex technical words in the English scientific texts.

Question 20

The aim of this question is to know the teachers' opinion about the possible reasons behind raising students' motivation towards scientific texts

	Sometimes	Yes	No
Selecting more suitable texts	14%	86%	00%
Using illustrations	29%	71%	00%

Table 3.27: Reasons behind Students' Motivation Gain

According to the teachers' responses in table 3.27, 86% of them admit that selecting texts that suit the students' level and interest can help to raise their students' motivation towards scientific texts. Besides, 72% of them believe that using illustrations is an effective means to explain scientific texts' knowledge and, consequently, win the students' interest to read such type of texts.

Question 21

The aim of this question was to know whether teachers praise their students after making an achievement in doing the different reading tasks or not and to identify

the emotional side that should exist between the teacher and the students and its role in the achievement of the reading objectives as a whole.

Sometimes	Yes	No
57%	43%	00%

Table 3.28: Praising Students after doing the Reading Tasks

The results in table 3.28 show that most teachers (57%), though not in a constant way, admit their praise and their cheery attitude towards all achievements done by the students in the major class tasks and in the reading tasks in particular. This is going, normally, to motivate the students more and omit all kinds of psychological fear towards reading in general and towards doing the reading tasks related to English scientific texts in particular.

To conclude, the analysis of the teachers' questionnaire help to confirm certain facts depicted in the previously analysed data of the students' questionnaire. For instance, it confirmed that the lack of prior knowledge whether to the English scientific text 'content or its pre-determined structure is one the major obstacles that impede the students' understanding. Moreover, the type of the complex sentence structure and the technical scientific vocabulary contribute more in the difficulty that the students face while reading the English scientific text. The analysis of the teachers' questionnaire data confirmed also the importance of the use of the illustration in clarifying the English scientific text's content and motivating the students more to read texts dealing with scientific topics. With regard to motivation, more teachers of English show interest to teach scientific texts and admit as well their students' interest to read such type of texts. However, it is apparent that the students' motivation should be sustained by the selection of English scientific texts that suit the students' level of interest and also adapt them in a way that could facilitate their understanding without bringing damage to the text recognised structure. One other more significant problem that complicates the teachers' task in dealing with the reading comprehension of the

English scientific texts is their lack of training for such type of texts. Teachers, for instance, are short of seminars that are devoted to tackle issues related to methods and techniques of English scientific reading comprehension. One important element which the teachers' questionnaire analysis revealed is that English scientific texts are part of a big branch of ESP that is EST. Thus, while dealing with such type of texts, the English teacher is asked to seek help and guidance from his colleague teaching the related scientific discipline.

3.5-The Observation Sheet

3.5.1-Purpose of the Observation Sheet

It has already said that the purpose of that observation sheet is to detect some prominent behaviour of both the teacher and the students while being involved in a classroom situation. Naturally, major gathered observations are supposed to confirm or deny the previously collected information by the two other research tools; the two different questionnaires given for the students and their teacher respectively.

3.5.2-Time of the Reading Session Attendance

The researcher attended the reading session of English scientific text with the third year level class at the end of the third term of the academic year 2010/2011.

3.5.3-Organisation of the Observation Sheet (see appendix 3)

The observation sheet focuses mainly on three major issues:

- The texts' activities
- The teacher's behaviour
- The students' behaviour

3.5.4-The Analysis of the Observation Sheet

With regard to the selected reading activities, the teacher suggested three different reading tasks. Evidently, his aim was to enable the students to grasp the main ideas of the text. That is to say, his main focus, as it is the case for most reading comprehension tasks' view in the Algerian school, was mainly on the "productive"

aspects of the texts. However, among the three tasks, no one appears to focus on the reading as “a process”. That is to say, a task that could help the learner to develop his cognitive strategies and thinking processes without giving much importance to the main output of the text. Such tasks, for instance, can include the method to find the main idea of the text, the adequate strategy to underline the key words of the text, the effective way that leads to determine the difficult words’ meaning, ect.... .With regard to the time spent with each activity, the students succeeded to do the three reading tasks in a relatively a short period of time. This can be partly explained by the fact that a similar few number of students were doing the suggested activities each time and not the majority of the students. In other words, only a small group of students showed interest to read the text and do the different reading tasks as it is clearly depicted by table A (see appendix 3).Thus, while working with that well-determined small group of students, the teacher saved much time that he could have spent much of it if all present students were really doing the suggested tasks. The rest of the time was spent mostly by the teacher in writing the activities on the board and then checking the students’ answers after finishing doing their reading comprehension tasks.

Many reasons can stand behind that students’ lack of interest to read the text. We can start first by the text itself. Although the text included no difficult words and even no complex sentence structures (see appendix4), it was quite a long text with six paragraphs long and without any accompanied illustrations on it .The target text, for instance, could have better attracted the students’ attention if it included a photo or a picture about the solar system and its fascinating components. Moreover, the text seems to bring no information to the students since they have already seen a similar text that talks about the solar system in their English textbook. Thus, although the teacher did well by not relying only on the texts proposed in the textbook but also by supplying texts printed on hand outs, he simply failed to attract his students’ interest because he did not innovate at the level of the text’ content. Besides, it should be mentioned that reading session was attended at the end of third term of the school year; that is at two weeks or three before the students’ final exams, including the Baccalaureate exam. Naturally, much of the students’ enthusiasm towards lectures

decreases in such period of time and much concentration are left for the decisive exams.

More importantly is that the target small group of students used only English while answering their teachers' questions. Indeed, this a positive point and a sign that some students still have motivation to English lessons in general and to the English reading sessions dealing with scientific subjects like astronomy. It is clear also that the students did not ask their teacher to explain for them any difficult lexis or even clarify the use of certain grammatical structures. Obviously, this is owed as it has been already been mentioned to the absence of all kind of difficult words or complicated sentence structures in the target text.

To sum up, the observation session for that reading lesson related to an English scientific text proved that most of the class students did not show much interest to read such type of texts. The absence of illustrations in the text, the "re-duplication" of the text's content, the timing of the reading session and even the weak level of the students contributed all in the lack of motivation of the students towards the target suggested English scientific text.

3.6-Conclusion

The analysis of the three research tools' data revealed many common reasons that lead to the difficulties that the third year secondary students encounter while reading English scientific texts. Such reading problems are related mainly to the students' involvement in the selected class activities, to the English teacher abilities and to the English scientific text qualities. With regard to the students, although most of them expressed their shared interest to study English and scientific English texts in particular, it is apparent that most students did not show much motivation to study English let alone dealing with English text related to scientific topics. This is mainly attributed to their weak level in English and to the method of teaching practised with English scientific texts' reading. It has been apparent also that the reading comprehension tasks seek only the productive aspects of the text and neglect teaching

the students the techniques of dealing with the text as “a process”. Moreover, the students attributed part of their failure to deal with English scientific texts’ reading to the technical vocabulary and the complex sentence structure that often characterise such type of texts. Furthermore, the students’ lack of knowledge to the text content and its common known structure contribute in the difficulty that the students face to understand the English scientific text. With regard to the English teacher, part of the problems they are facing while dealing with the reading comprehension of the English scientific text is related to their lack of training in such type of reading texts. Besides, we deduced that the English teacher who is involved with the preparation of the English scientific texts’ reading comprehension tasks is in real need of the support and help of his or her colleague teaching a science discipline. Finally, the English teacher is asked to attract his or her learners’ interests at a certain high degree while he or she wants to deal with English scientific text’ reading comprehension task. This can be better achieved with the incorporation of a range of scientific tools such as pie charts, pictures, maps, diagrams that could facilitate the scientific texts’ understanding to the students. With regard to the text, its lack of illustrations plays a negative role on the students’ ability to reach an easy understanding to its content. Moreover, in addition to the type of its lexis and its sentence structure, the English scientific text major different structures which are not yet recognisable by the students impede the students’ relentless efforts to understand it.

Chapter 04:

Recommendations and Pedagogical implementations

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4.1- Introduction

Our study has been conducted to investigate the major difficulties that the third year secondary school students find when reading English scientific texts. In the light of this important aim we attempted to find out some linguistic elements that actually hinder the students' reading comprehension ability to understand English scientific texts. In the last chapter, we have provided a data analysis of two separate questionnaires for third year secondary school English teachers and students respectively and then an analysis of an observation sheet data gathered during an attended reading class session with the target group of the "terminale" students.

The analysis of the three research tools yielded very interesting results:

Varied problems and difficulties face students while they are involved in a reading task related to English scientific texts. Among these difficulties, three major problems appeared to hinder the students' abilities to such type of texts: The poor level of the students in English, The specificities of the English scientific texts and the inadequate teaching methods related to the reading skills practised with the English scientific text.

In the light of these results we recommend the following implementations and suggestions which are, in fact, a "brochure" of teaching strategies addressed typically to the English teacher that could help him or her to devise a more adequate reading lesson plan organisation for the English scientific texts.

4.2- Recommendations to the Teacher of English

All pedagogues admit the crucial role performed by the English teacher in the success of the EFL teaching -learning process. They also admit that he or she has succeeded to assume such a role after being honoured to be considered as the guide, the supervisor and the facilitator of the language skills 'learning. However, this would be the case for the EFL teacher. Yet, as far as our research is concerned, the English teacher undertakes a more important role when being involved in special field of English language teaching which is ESP (English for Specific Purposes). Since our

study is concerned with a very determined field of ESP and more precisely EST teaching which is reading English scientific texts, we will attempt to set out some important reading strategies that the English teacher should provide the students with in order to facilitate for them the reading comprehension task of such type texts.

4.2.1-Metacognition

Many definitions have been attributed to the word ‘reading strategy’. One clear attributed definition is that stated by Wellman (1988) who says, “*To be a strategy, the means must be employed deliberately, with some awareness, in order to produce or influence the goal.*” Hence, the emphasis with the term “strategy” is on “*deliberative actions*” rather than “*reflexive*”. More precisely, the term “*reading strategies*” emphasises the reader’s active participation and the actual way of doing something. This goes in contrary with the term “*skills*” which suggest the reader’s competence or only passive abilities which are not necessarily activated. Being able to gear the reading strategies lead us to talk about an important aspect of the reader’s thinking and learning process which is metacognition. So, what is metacognition?

According to O’Malley et al., (1985), metacognitive strategies involve thinking about the learning process, planning for learning, monitoring of comprehension or production while it is taking place, and self-evaluation of learning after the language activity is completed. It is clear that cognitive strategies are more directly related to individual learning tasks and entail direct manipulation or transformation of the learning materials. One reason which makes metacognition important is that if learners are not aware of when comprehension is breaking down and ignore what they can do about it, strategies introduced by the teacher will fail. According to Flavell (1978), metacognitive abilities can be grouped into two categories: (1) knowledge of cognition and (2) regulation of cognition. The first, knowledge of cognition, includes the reader’s knowledge about his or her own cognitive resources and the compatibility between the reader and the reading situation. Thus, the reader cannot take steps to meet the demands of a reading situation more effectively unless he or she is aware of what is needed to perform efficiently. With regard to the knowledge of cognition, Paris

et al., (1983) identified three components related to it: “*declarative*”, “*procedural*” and “*conditional*” knowledge. Declarative knowledge refers to “*knowing what*”. A learner may know what a given reading strategy is, for example, she or he may know what summarisation is and what summaries are. Procedural knowledge is “*knowing how*” to perform various actions, for example, “how to study, how to deal with analogies, or how to write summaries”. Conditional knowledge refers to “*knowing why*”, and includes the learner’s understanding the value or rationale for acquiring and using a strategy, and when to use it. Moreover, the reader needs to know whether a certain strategy is appropriate or not and whether or not it is working effectively. This can only be accomplished by the conditional knowledge

The second aspect of metacognition, “*regulation of cognition*”, refers to the regulation of the reading skills. According to Baker and Brown (1984), these reading skills are related to planning, monitoring, testing, revising and evaluating of the strategies employed during reading. Furthermore, those regulatory reading cognitive skills, as identified by Carrell (1988), have different uses such as:

- a) Clarifying the purposes of reading, that, understands both the explicit and implicit task demands.
- (b) Identifying the important aspects of a message.
- (c) Focusing attention on the major content rather than trivia.
- (d) Monitoring ongoing activities to determine whether comprehension is occurring.
- (e) Engaging in self-questioning to determine whether goals are being achieved, and
- (f) Taking corrective action when failures in comprehension are detected.

In the light of those different uses of the regulatory reading cognitive skills, a number of studies agree on the fact to train the students on the metacognitive strategies in order to reach an effective EFL/ESL reading. Roehler and Duffy (1984), for instance, point out,

“Teacher explanations of the processes are designed to be metacognitive, not mechanistic. They make students aware of the purpose of the skill and how successful

readers use it to actively monitor, regulate, and make sense out of text, creating in students an awareness and a conscious realisation of the function and utility of reading skills and the linkages between these processes and the activities of reading.”

However, one important question that should be raised is *what* constitutes a careful and complete explanation of a reading comprehension strategy?

Winogard and Hare (1988) proposed the following five elements as constituting complete teacher explanation:

1)-What the strategy is,

At this first stage, teachers should describe critical, known features of the strategy or provide a definition/description of the strategy.

2)-Why a strategy should be learned,

That is to say that the very beginning of the lesson teachers should tell students why they are learning about the strategy. According to Winogard and Hare (1988), explaining the purpose of the lesson and its potential benefits seems to be a necessary step for moving from teacher control to student self-control of learning.

3)-How to use the strategy,

Here, teachers break down the strategy, or re-enact a task analysis for students, explaining each component of the strategy as clearly as possible and showing the logical relationships among the various components. In other words, the teacher is required to give full explanation and all implicit details about the appropriate use of such or such strategy. Without understanding the functioning of the target strategy, the student will simply fail to master it and gain full control over it.

4)-When and where the strategy should be used,

Teachers should portray appropriate circumstances under which the strategy may be employed, (e.g., whether the strategy applies in a story or informational reading). Teachers may also describe inappropriate instances for using the strategy.

And 5) - how to evaluate use of the strategy,

Teachers should show students how to evaluate their successful or unsuccessful use of the strategy and also supply them with additional strategies that can help them solve the remaining problems as part of a remedial work.

In the end it should be noted that although the metacognitive reading strategies seem to cover EFL/ESL general reading aspects, their effectiveness can also serve in reading texts of EST reading aspects as well. One more important point is that much of the success and effectiveness of the metacognitive reading strategies to solve students' reading problems depend so much on the appropriate teacher' competence and training to use those strategies.

4.2.2-Prior Knowledge Activation

The second strategy that English teachers can use in order to help their students read English scientific texts is the prior knowledge activation. Prior knowledge refers simply to the background knowledge or the past experience that the students use to make connection with the text they are reading in order to increase their comprehension. Good readers always check the meaning of what they are reading by seeing if it fits with what they already know. Thus, when skillful readers encounter information or words they have not learned, they activate their background knowledge to relate the new information or words to previously acquired information or word knowledge. Even when they simply read passages, they can bring out connected information as much as possible from their prior knowledge. For example, while reading a text about fish, they tap their memory to gather information regarding fish, such as types of fish, places they live, and their characteristics. Making associations with the text information helps them understand the text. On the other hand, struggling readers do not connect new information or words to old by making use of their background knowledge. This isolates struggling readers and causes increased difficulty. In this regard, Christen et al., (1991) state,

“We know that prior knowledge is an important step in the learning process. It is a major factor in comprehension: that is, making sense of our learning experiences.

Brain-based research confirms the fact that the learning environment needs to provide a setting that incorporates stability and familiarity. It should be able to satisfy the mind's enormous curiosity and hunger for discovery, challenge, and novelty. Creating an opportunity to challenge our students to call on their collective experiences (prior knowledge) is essential. Through this process we move students from memorising information to meaningful learning and begin the journey of connecting learning events rather than remembering bits and pieces. Prior knowledge is an essential element in this quest for making meaning.”

Christen et al., (1991) have also identified three possible phases where the student' prior knowledge can be activated:

- (1)- Building readers' background knowledge.
- (2) Activating readers' existing background knowledge *before* reading.
- (3) Guiding readers *during* reading and providing review *after* reading.

Thus, according to them, when readers lack the prior knowledge necessary to read, three major instructional interventions need to be considered:

- (1) Teach vocabulary as a pre-reading step.
- (2) Provide experiences.
- (3) Introduce a conceptual framework that will enable students to build appropriate background for themselves.

With regard to *pre-teaching vocabulary* , this requires that the words to be taught must be key words in the target passages, that words be taught in semantically and topically related sets so that word meaning and background knowledge improve at the same time, and that only a few words be taught per lesson and per week. With regard to vocabulary teaching strategies, a part of our discussion in this chapter will be devoted to tackle some of the main strategies that help students learn science vocabulary.

With regard to *enriching background knowledge and conceptual frame work establishment*, this can be developed through the presentation of background information that is relevant for the target passage regardless how specific or general it was. Moreover, Christen et al., (1991) suggested the following method to check out

what prior knowledge exists about a topic, idea, or concept. This can include one of the following activities:

- Brainstorm the topic. Write all the information solicited from the students on the chalkboard, a piece of paper, or transparency.
- Ask for specific and/or general questions about the topic. See what responses are given.
- Post a problem or a scenario. Based on this description, find out what the students know about the idea presented.

Last but not least, Christen et al., (1991) insisted that teachers should remember to:

- (1) -Present information which builds: Background ideas, Concepts and Principles
- (2)- Show, do not tell, through: Demonstrations, Multi-media and Graphics.
- (3)- Use outside resources, trips and speakers.
- (4) -Tell about topic from your experience

However, this useful strategy needs a constant implementation from the part of the reader and with the evident teacher's assistance in order to be activated. With regard to English scientific texts, this activation may be accomplished through different means. For example, it can be activated by the identification of the recognition of the different texts' structures, by texts' relevant content, by concept mapping or even by the incorporation of graphs and other illustration. Our discussion will be devoted to shed light on each one of those means as being important reading strategies that can both activate the readers' prior knowledge and enable him or her to have a more lucid way to understand scientific English texts.

4.2.3-Scientific Text Structure Recognition

One of the main reading strategies that can help the students to reach a better understanding of the expository text is being able to identify its relevant typical structure. According to Englert and Heibert (1984), when reading expository texts students must not only attend to the information in the text but also identify the type of text structure used to identify it. In the literature review of our thesis we have already

mentioned the following variety of different organisational structures of the expository texts as set out by Weaver and Kintsch (1991):

1. Enumeration—a list of facts concerning a single topic.
2. Sequence—a series of events that occur over time.
3. Compare–contrast—a focus on the similarities and differences between two or more topics
4. Classification—information organised according to categories.
5. Generalisation—one major idea contained within a few sentences.
6. Problem–solution—the statement of a problem followed by its solution.
7. Procedural description—the steps used to carry out a task.

Identifying those different types of expository texts' structures will help students build an effective mental model of the text and thus will improve their understanding and recall to the main text ideas. Unfortunately, many students (perhaps most of them) tend to ignore the subtle distinction between the previously mentioned different types of expository structures.

However, without effective training the students cannot take a full advantage to benefit from the recognition of those expository structures. Thus, we would like to present a brief description of the main procedures to train the students for some of the previously listed expository structures. One of the most helpful texts' structures is the compare and contrast structure. Therefore, we would introduce some of the main components that make up the training for compare and contrast strategy as depicted by Williams (2005).

4.2.4-Training for Compare and Contrast Strategy

With regard to compare and contrast text's structures, several strategies have been suggested to deal with that type of texts. We will focus mainly on one reading strategy that can help readers to understand expository texts which is the compare and contrast strategy .It was introduced by Williams (2005) who taught students how to use (1) clue words to identify a text as a compare–contrast text, (2) a graphic organiser

to lay out the relevant information in the text, and (3) a series of questions to help them focus on the important ideas of the text. His suggested strategy included the following points:

1. *Clue words: alike, both, and, compare, but, however, then, and contrast.* The teacher introduces the words and also previews the purpose of the lesson.

2. *Trade book reading and discussion:* The teacher reads to the class from the encyclopedia and trade books and then leads a discussion about the content. The teacher provides information about the topic beyond the specific information contained in the target paragraphs. The purpose is to increase motivation, given that students' ability to comprehend expository text is based, in part, on their interest.

3. *Vocabulary development:* The teacher introduces vocabulary related to the topic.

4. *Reading and analysis of a target paragraph:* Students read the target paragraph silently, and then the teacher rereads it aloud while students follow along. Students then analyse the text, using the compare–contrast structure. They identify the individual sentences that represent specific similarities and differences and circle key words. Then they take turns generating sentences that describe similarities and differences. The teacher models how to do this and encourages well-formed sentences based on information from the paragraph and including at least one clue word.

5. *Graphic organiser:* Students organise the paragraph's content with the help of a compare–contrast matrix (one for each feature compared). Students write a well-structured comparative statement to match the content in the matrix.

6. *Compare–contrast strategy questions:* Students organise the statements they have generated using these three questions:

(a) What two things is this paragraph about?

(b) How are those two things the same?

(c) How are they different?

7. *Summary (with a paragraph frame as support)*: Students write summaries, using a paragraph frame as a prompt. This step is particularly helpful with younger students. In later lessons, when students are more proficient, no frame is needed.

8. *Lesson review*: The teacher and students review the vocabulary and strategies (clue words, graphic organiser, and compare–contrast questions).

The diagram below can better illustrate the comparison and contrast reading strategy.

What two things are compared and contrasted?	
On what feature?	
Alike?	Different?
On what feature?	
Alike?	Different?
On what feature?	
Alike?	Different?

Figure 4.1: Compare-Contrast Think –sheet (adapted from Haager and Klinger, 2005).

As one can notice, we have not provided a detailed description for types of texts’ structures but, instead, we have tried to spot light on the most important and

most conspicuous structures and the most helpful to the students. Naturally , it is the English teacher’s role to implement on the suggested expository text structures’ strategies and reflect which one is the most appropriate for his students’ level and interest before taking the decision to incorporate them in the teaching methods used with the scientific texts in general.

At any rate, the following table summarises the expository texts’ main features with their corresponding reading objectives and strategies.

Structure	Format	Signals	Reading objective	Study Strategy
Main idea	Focus is on single topic,with supporting details.	Definitions , principles , laws	To understand the main idea and be able to explain it using supporting details.	Identify and restate the main idea .Select and list at least three supporting details
List	Focus is on general topic , with of facts or characteristics	Semicolons , numbers , or letters in parentheses	To recognise the general topic and be able to list specific characteristics.	Identify and restate the topic .Select and list at least four characteristics.
Order	Focus is on general topic, with a connected series of events in order.	Words such as <i>first, second, then</i>	To identify the topic, describe each step in sequence, and tell the difference among steps.	Identify and restate the topic. Select and list the steps .Tell what is different from one step to another.
Compare-contrast	Focus is on the relationships (similarities and differences) between two or more things.	Phrases such as <i>in contrast , the difference between</i>	To identify the topics and discuss the similarities and/or differences	Identify and restate the topic. Use a graphic organiser (e.g., a table with two columns , a Venn diagram)to write what is the same and/or different
Classification	Focus is on grouping information into categories	Words such as <i>can be classified, are grouped , there are two types</i>	To identify topics , list class and group factors , understand how they differ , and classify new information	Identify and restate the general topic. Write down the categories and related information in a table with columns

Table 4.1: Text Structures, Formats, Signals, Reading objectives, and Study Strategies (Adapted from Janet et al., 2007)

Naturally, some text structures seem more effective than others. Obviously, the text that can help students make connections is the most helpful in terms of understanding and memory. Therefore, Readers who know how an expository text is organised have a better idea of how to read and understand its content. When they know a text has a cause and effect structure, they can focus on finding the cause(s) and result(s) that the text is highlighting. Once they know what to focus on while they are reading, they get a clear frame of the text, which helps them better comprehend content.

4.2.5-Establishing Scientific Vocabulary Knowledge

Because expository texts tend to have complicated vocabularies, it is essential for readers to develop their vocabulary knowledge. English words relating to science and scientific concepts are among the most difficult words to spell and memorise by the students. Thus, teachers are always in need of additional ways to help students learn and retain science vocabulary. In the second chapter of our thesis we have mentioned some of types of science vocabulary that make students struggle in order to grasp their meanings and understand the meaning of the supporting text as a whole. This includes lexical and grammatical metaphors and some distinctive types of nominalisation. Our main concern in this part of our discussion will be devoted to tackle some of the main strategies that could help EFL/ESL students to a more adequate and effective learning of scientific vocabulary.

Traditional vocabulary instruction in the science classroom involves assigning students to look up words from the textbook in the dictionary and memorising the information before the test. Indeed, this seems to be a great burden for teachers and learners .Instead, learners need to learn science vocabulary on better adequate methods that would help them to acquire scientific literacy.

English language learners have the added burden of trying to learn science in a language they have not yet mastered. Accordingly, Lee et al., (2009) state that many teachers mistakenly believe that ELL students must first learn English before learning

science .However, recent approach to teaching science vocabulary is based on hands-on inquiry instruction. Through hands-on inquiry instruction, all students can develop context-based content knowledge along with language development. Lee et al., (2009) identify inquiry-based science instruction as beneficial to students in the following ways:

- a) Students participate in activities as they learn vocabulary.
- b) Students work collaboratively and interact with others about science content.
- c) Hands-on activities offer students written, oral, graphic, and kinesthetic forms of expression.

Coupled with science activities, intentional and explicit vocabulary instruction can benefit both English proficient and ELL's vocabulary and literacy development as they learn science content. As students combine science experiences with discussions of words' uses and meanings, their vocabulary and content knowledge can grow and eventually support their development of scientific literacy.

4.2.5.1-Strategies for Teaching Science Vocabulary

The following suggestions refer to strategies which are designed by Sarah Carrier (2011) as an attempt to enhance science vocabulary development for EFL students who depend on school to learn academic English .According to her, teachers can begin to help all students engage in the language of science through the use of these strategies.

4.2.5.1.1-Time to Talk

It is important to promote students' dialogue as they have instructional conversations. We need to provide students with opportunities to use their colloquial language and translate back and forth with scientific and technical terms. We have already mentioned in the second chapter of the thesis that students come to the class with certain former naïve knowledge, most of the time wrong concepts, which must be re-arranged by the English teacher. In this regard, Sarah Carrier (2001) sets out a

strategy, called *interlanguage*, to discuss the different explanations of the students' experiences in the classroom. She suggested the following example to clarify that fact:

- Student: We put this smooth powder in the bag along with the crunchy powder and the bag blew up and got hot.
- Teacher: We mixed baking soda and calcium chloride with water resulting in a gas, and heat was released.
- Scientist: The combination of baking soda and calcium chloride is an exothermic reaction with the products of sodium chloride, calcium carbonate, and carbon dioxide.
-

4.2.5.1.2-Giving Instructions

According to Sarah Carrier (2001), students can be supported in the information processing by supplementing auditory information with visual clues. That is to say, we can help students, especially slow learners by the association of our instruction with the relevant visual aid to clarify meanings. In other words, Instructions should be given using a variety of visual or aural support materials such as:

- Drawings, diagrams, and pictures to support the spoken word.
- Written instructions on word cards or smart board along with verbal instructions.
- Set-up examples to supplement written lab instructions.
- Audio taped instructions alongside written directions.
- Pictures with words in stages of lab procedures that students can sequence.

4.2.5.1.3-Reading Science Text Cards

Reading science text cards is the third strategy that Sarah Carrier (2001) suggests to teach students scientific English vocabulary. According to her, text cards help students interact with words and their meanings. This strategy involves that teachers can create science text cards by writing statements about science concepts on index cards. Working individually or in small groups, students discuss the statements before sorting. A number of different formats can be used. This can include *matching pairs*, *sequencing* and *classification*. We selected *matching pairs*, *sequencing* and

classification as simple instances that can better clarify the suggested strategy. Here is the explanation of each one of these reading cards activities as proposed by Sarah Carrier (2001):

4.2.5.1.3.1-Matching Pairs

In this activity students are given a stack of cards and asked to match a term with its associated function, symbol, scientific name, etc. For example, a stack might include cards with the names of body parts and other cards that name the body parts' functions. Students match each part to its appropriate function. Other topics for matching pairs could include:

- Parts of a device and its function (e.g. simple machines).
- Types of teeth and their functions for classification of animals.
- Common name and scientific name.
- Material and its common use.
- Technical term, meaning, image.
- Chemical name and symbol.

4.2.5.1.3.2-Sequencing

Sequencing serves better lessons dealing cyclical concepts .With regard to cyclical concepts like the water cycle or the seasons, one card is created for each stage in the cycle. Students, then, are required to arrange the cards in a circular formation to represent the stages of the cycle. Examples can include:

- egg, larva, pupa, adult
- spring, summer, fall, winter
- evaporation, condensation, precipitation, accumulation

4.2.5.1.3.3-Classification

In the task of classification the students are asked to make a set of index cards naming vertebrates, for example, and another set with characteristics of each group - one characteristic per card:

Vertebrates	Characteristics
Birds	feathers, beaks, lay eggs
Reptiles	scales, cold-blooded, leathery eggs
Amphibians	cold-blooded, life cycles on water/land
Mammals	fur, warm-blooded, mothers provide milk for offspring
Fish	gills, cold-blooded

Table 4.2: Learning Science Vocabulary by Cards' Classification
(Adapted from Sarah Carrier, 2011)

These cards can be used in two different ways:

1) Pass out one card to each student, and have them find the other students who belong in their group.

2) Mix up the cards and have students work in small groups to sort the characteristics into the appropriate groups. Additional examples for this strategy include:

- Simple machines and examples of each.
- Insect orders and characteristics of each.
- Ecosystems with plants and animals that live in each.

4.2.5.1.4-Word Lists

Many teachers use word walls to provide visual clues to words introduced in class. It is also important for teachers and students to *use* the words as much as possible. The real task here is to ask students to gather words in distinctive categories according to certain shared features that characterise each category. Students can look at the written words as teachers use them during class discussions, and teachers should encourage students to use the language of science in their verbal and written communication. Work with students to group words by their features:

- **Procedure words:** compare, describe, investigate, test, recognise, alter, minimum, similar, same, size, support, ect...
- **Opposites:** strong/weak, long/short, fast/slow, soft/hard, cool/heat, cold/hot, ect..
- **Movement words:** slide, travel, roll, slow down, speed up, accelerate, sink, float, ect...

4.2.5.1.5-Word Parts

Teachers can reinforce the structure of words as students identify and interpret prefix, suffix, base word and their meanings:

- **Photosynthesis** — photo (light), synth (make), isis (process)
- **Metamorphosis** — meta (large), morph (change), osis (process)

4.2.5.1.6-Multiple Meaning Words

Words with multiple meanings can be confusing for students proficient in English and are especially troublesome for English language learners. It is important to discuss these meanings with students. When we confuse common definitions with meanings used in science, students' understanding suffers. Sarah Carrier (2011) illustrates this fact in the different meanings of the words “*theory*” and *reflections*”. For example, in common use, “*theory*” means a hunch, while in science; a “*theory*” is a well-established explanation of the natural world based on solid empirical evidence. “*Reflections*” are commonly thought of as thoughts or musings, which contrast with “*reflections*” of light rays. Many other words appear in both scientific vocabulary and in everyday speech, including: matter , observe ,variable ,conductor, conservation ,living, volume , balance, receiver, communicate ,ect..Thus, it is important to work with students to identify the different meanings and applications of words with multiple meanings.

4.2.5.1.7-Graphic Organisers or Conceptual Maps

When students interact with science words in multiple ways, they are able to approach words and their meanings more closely. More importantly, graphic organisers can help the students to learn the meaning of the science words by presenting using different context. The concept definition map is created by placing the science word in the center of a science concept graphic so that the student understands the word using his or her previous knowledge.

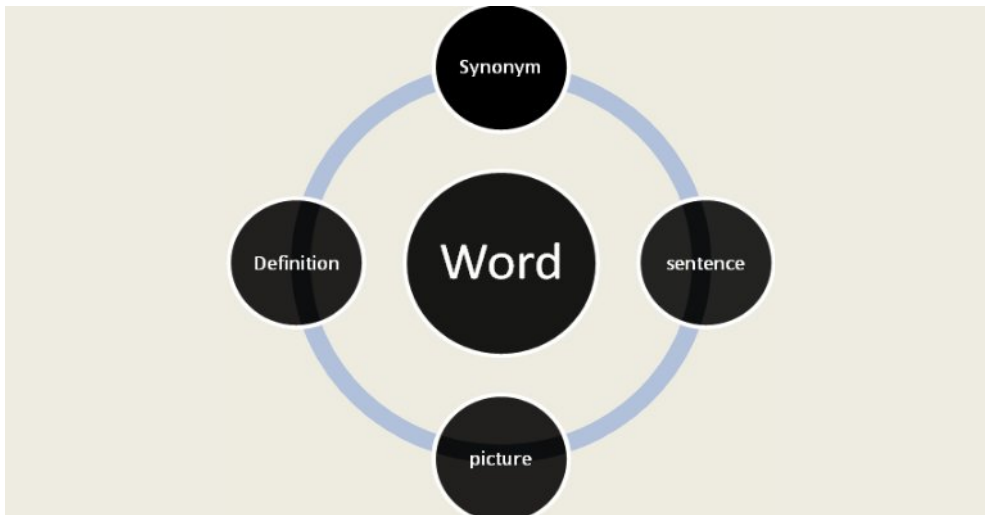


Figure 4.2 : Graphic Organiser and Science Vocabulary Learning
(Adapted from Sarah Carrier, 2011)

In short, this initial list of strategies suggested by Sarah Carrier (2011) provides a starting point for an effective method of learning scientific vocabulary that combines both science content and vocabulary instruction. Indeed, it is an adequate way to avoid falling back on traditional vocabulary instructions practices. Evidently, the area of science vocabulary learning is still wide enough for teachers to implement on additional research-supported strategies that could help build depth of vocabulary knowledge and foster word consciousness among EFL students in particular.

4.2.6-The Role of Illustration in Science Language Communication

One of the main features of science communication is that it goes beyond verbal language. That is to say, the spoken and the written word. Lemke (1998) confirms this fact when he said that words are important but in science more than any other subject we rely on a combination and interaction of words, pictures, diagrams, images, animations, graphs, equations, tables and charts. Thus, the old saying which goes “a picture is worth than thousands words” is truly depicted in scientific language communication. According to Jerry and Jonathan (2001), words, pictures, diagrams, images, animations, graphs, equations, tables and charts all convey meaning in different ways. According to them, there are certain meanings we want to convey in science that cannot be possibly put in words alone. Thus, messages in charts and graphs, for example, can never be replaced by the written word, whether we use one

thousand or two. Moreover, Jerry and Jonathan (2001) made hints to other elements rather than graphs that could carry strong meaning of the scientific findings and concepts to the mind of the students when they said,

“The smells of science (which adults remember most vividly of all from their science lessons) or the touch and feel of practical work cannot be put into words. Gestures and other body language can convey scientific ideas more effectively and memorably than chalk and talk, or a passage in a textbook.”

Furthermore, they stated that Equations and mathematical symbols can sum up for some pupils some difficult ideas which are very lengthy in words.

Because of the importance of the interaction and the combination of both the verbal and non-verbal *language* in the scientific language communication, Jerry and Jonathan (2001) suggested the following skills that the art of a good communication in science involves:

1-The recognition that teaching and that of science in particular, does involve a range of modes of communication such as:

- The spoken and written word.
- Visual representation.
- Images, diagrams, tables, charts, models and graphs.
- movement and animation of physical models, e.g. beach ball for the Sun, a pea for the Earth, or using multimedia, gesture or other body language.
- Practical work, with its feel, touch, smell and, of course, sounds.
- Mathematical symbols, either as shorthand or in the form of equations to convey a connection.

Besides, teachers need to be aware of this wide range of modes and of how to use them in developing pupils' knowledge and understanding in science.

2 -The awareness of these different modes and the recognition that different modes suit different learners and that some modes work best for some learners – other

ways of conveying meaning work better with others depending on the students' learning style.

3-The ability to switch from one mode to another when teaching. If one technique is not working then good teachers switch to another way to convey lessons' items in a more lucid way. It should be known that sometimes even within a mode, e.g. the spoken word, one line of explanation or one analogy may not be working with a group of students. The teacher's task is to move to a different approach within that mode, or even a new mode completely, e.g. to use a physical model instead of talk or chalk. Each mode has its value and its limitations.

In summary, communicating in science teaching presents both a challenge and an opportunity for the teacher of English. It is a challenge because science education involves a range of ways of communicating (visual, verbal, graphical, symbolic, and tactile) which can be exploited to engage with different learning styles or abilities and to provide a variety of teaching approaches. Moreover, it is also an opportunity since the English teacher real task while being involved in a task of performing an English session dealing with scientific knowledge is to learn as much as much possible from the experiences of his or her colleagues science teacher. This fact has been tackled in the second chapter of thesis when we mentioned the major contributions brought by Widdowson (1979) to the field of EST teaching. Our next discussion will portray Widdowson's own conception to an EST teaching methodology.

4.2.7-Widdowson's Practical Approach to English for Science and Technology Teaching

As it has been already mentioned, Widdowson brought important contributions to the field of EST teaching .Among these contributions he succeeded to set out a genuine conception of an EST discourse teaching methodology. As a starting point, Widdowson (1979) claimed the close relation that should exist between the English

teachers' pedagogy and that of the pedagogy of science as a subject in order to reach a relevant English use. In this regard, Widdowson stated,

“The reason for this is that the closer the English teacher's methodology can be approximate to that of science teaching, the more successful he will be in integrating the two areas of knowledge whose synthesis constitutes relevant English use.”

In this light, Widdowson assumed a procedure that could help English teachers in particular to teach science when being involved in English lessons. In fact, it is a kind of information transfer exercises as being labelled and suggested by Widdowson (1979). The information transfer exercises should incorporate certain non-verbal devices such as a diagram, a pie chart, a picture, ect.... Moreover, Widdowson's conception in EST teaching is based on the English use.

To be brief and clear, let us mention and explain the two instances that Widdowson (1979) suggested for the information transfer exercises. In the first instance, Widdowson (1979) suggested that the teacher can give a brief description of an experiment, a mechanical device, a piece of equipment and so on. This would be the first instance of use. Then, the teacher might require the students to label a given diagram, or draw a diagram of his own which represented the facts of the description. This would be the first instance of non-verbal. According to Widdowson (1979), the transfer here is essentially a comprehension task. In the second instance, the teacher presents a second diagram which represents the same kind of information (realises the same type of concept or procedure) as the diagram that the student has already completed and now he is required to derive a description from it which will be correspondingly similar to the original description, which, of course, acts as a model for the second instance of use. The transfer from the second instance of verbal device to the second instance of use is essentially a composition task. Widdowson (1979) represented the information transfer process as follows:

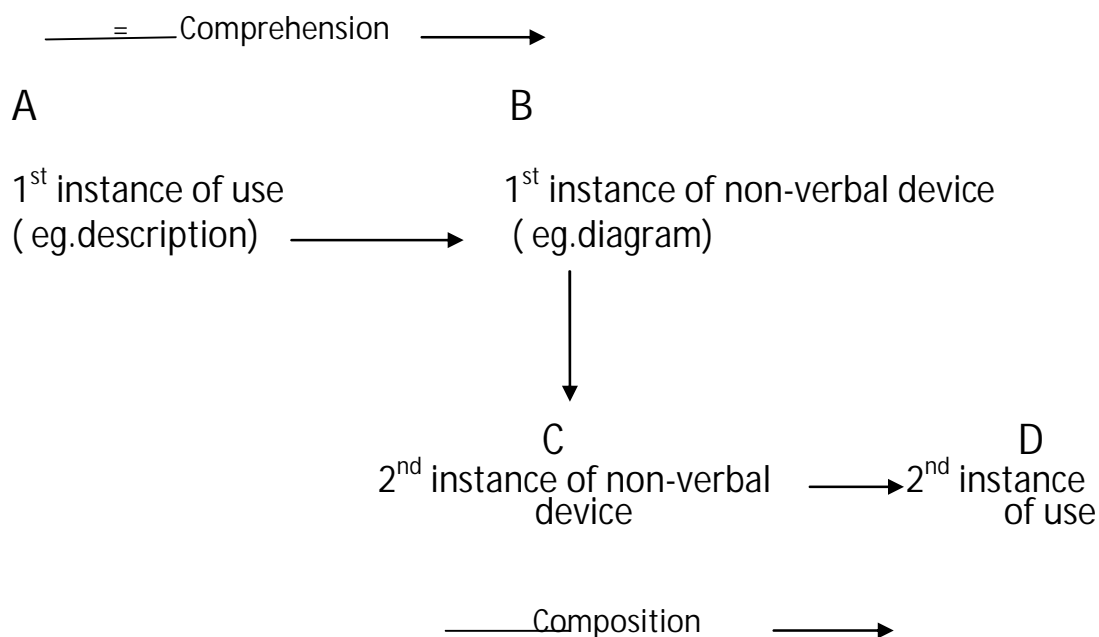


Figure 4.3: Information Transfer Process (Adapted from Widdowson, 1979)

In brief, Widdowson's implementations on English scientific texts reading comprehension drills seem to bring an innovative aspect at the level of EST teaching. One of the main new features it carries is that it came to put an emphasis on the importance of English language use when being practised with the science discourse. More importantly, Widdowson's new conception about EST teaching held the innovative role for the EST teacher. Indeed, according to Widdowson (1979), the student has some knowledge of English usage and some knowledge of how his own language is put to use in scientific discourse. The task of the EST teacher is synthesise these two kinds of knowledge. That is to say, to convert usage into use by reference to the student's existing communicative competence in his own language.

4.3-Conclusion

In conclusion, in this chapter we have attempted to depict some reading strategies that could help the teacher of English perform an adequate reading lesson plan for an English scientific text and could, as well, help students to overcome some reading obstacles they encounter in this type of reading texts. Training students on metacognitive strategies, the activation of their prior knowledge and the identification of the different types of expository texts appeared to be among the most efficient

strategies that could facilitate the reading task of the English scientific texts for the students.

In the end, it is important to get convinced that those are, in fact, just an initial sample of reading strategies. Therefore, the field of research is still wide to be enriched with other strategies that would facilitate the English scientific texts' reading comprehension for the EFL learners and for the for the third year secondary school students' level in particular.

General Conclusion

Our present study was devoted to investigate why the third year secondary school students are unable to understand English scientific texts and help them overcome the difficulties when reading this type of texts. Three hypotheses were suggested as a starting point for seeking answers to our enquiry to identify the main problems and difficulties that hinder the students' ability to understand English scientific texts. One possible factor is owed to some specific linguistic features of scientific texts in general. Besides, the learners' psychological anxiety was expected to be another "handicap" that could prevent them from having a more lucid access to understand English scientific texts. Moreover, the students' lack of some reading strategies that are typical to scientific texts might be another obstacle that could limit their abilities to read such kind of texts.

Three main research tools were involved in order to confirm or reject the previously mentioned hypotheses: a questionnaire to a class of third year secondary school students, a questionnaire to a group of teachers teaching the secondary level and an observation sheet which aimed to detect the students' behaviour while dealing with English scientific text.

The data analysis of the three research tools yielded very interesting results:

First, The poor level of the students in English and their lack of effective strategies to deal English scientific texts prevent them from understanding this type of text and have a negative impact on their motivation towards learning English in general. In other words, students did not show much interest to study English as being a secondary subject compared with the other scientific subjects involved in the school curriculum such as mathematics and physics which attract more their interest. Besides, the specificities of the English scientific text including its type of technical terms and its complex sentence structures complicate more the reading comprehension task of the English scientific text for the third year students and lead to their reading anxiety. Moreover, the teaching methods related to the reading skills practised with the English scientific text in particular need much implementations and revision to be in accordance with the amount of proficiency specificities required by such type of texts.

In the light of this result , it was important to devote a fourth chapter whose objective was to suggest some reading strategies that can be used by the teacher of English in order to help his or her students understand English scientific texts without facing much difficulties. A wide range of reading strategies related to English scientific texts that need to be mastered and practised by the teacher of English is incorporated in the fourth chapter of this thesis.

In short, it seems clear that field of research in the teaching methods and techniques dealing with scientific texts' reading comprehension is an important field that deserves much more time and effort investment .This is partly because it is a part of EST and, thus, of ESP; the recent approach of English language teaching. We all agree that ESP covers different categories of language teaching. Thus, solving the problems of scientific texts' reading will open other issues for the branches and varieties of ESP. One thing is sure which is that ESP is not a matter of science words and grammar for scientists and so on. Indeed, much focus should be on the complex underlying structure and communication than just dealing with the surface features that we read and hear.

Last but not least, we hope that our conclusions, observations and suggestions will help students overcome difficulties when they read scientific English and raise teacher's awareness of the whole situation of teaching English dealing with science to the secondary school students.

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Appendices

Appendix 1

Questionnaire/ students

Before you start answering the questions, would you please provide us with some information about yourself (put a cross in the right box).

Gender: male female Age: _____ Branch: 3rd year Scientific Stream

I-Learning Skills:

1- Which one (s) of the four English skills is/are the most important for success in English learning according to you?

Listening Speaking Reading Writing

2- In examinations which skill is mostly focused on?

Listening Speaking Reading Writing

II-Reading skill Strategies:

Questions

3-Which of the following reading strategies do you often use to understand reading texts in general?

- Skimming and Scanning
- Translating into Arabic or French
- Paraphrasing using your own style
- Using context to find meaning

III-Reading Scientific texts

Yes NO

4-Do you like reading English texts of scientific topics?

5-If yes, which branch of science do you like reading most?

- Biology
- Astronomy
- Physics
- Geology

6-How do you find reading English scientific texts compared with the other general English text? - as simple as

-more difficult than

- less difficult than

-Less enjoyable than

7-If there are any difficulties that prevent you from understanding scientific texts, what are they?

- type of vocabulary

- structure of sentences
- lack of prior knowledge
- fear towards scientific texts
- teacher's methodology

8-Do you find the Scientific English vocabulary

Very technical?

Accurate and exact?

Difficult to understand?

Sometimes Yes No

9-Do you try to understand them in their context?

10-Do you find a difference between the reading of scientific texts in your English textbook and dealing with them in other scientific disciplines?

11-If there is a difference , is dealing with them in an English class

More motivating?

Less enjoyable?

More difficult?

12-Does you teacher of English try to adapt or even supply other scientific text apart from those selected in your the English textbook?

13-Do the selected texts suit your level and interest?

14-Do illustrations, maps, graphs and diagrams help you better to understand scientific texts?

15-are illustrations in the English textbook well -presented?

Iv-Students' Psychology:

-Do you enjoy reading scientific Texts written in English?

-Do you find Scientific English texts boring?

-Do you find them interesting?

-Do you find them free from all kinds of emotions that are sometimes encountered in literary texts?

-Do you like the direct style of scientific texts?

-Do English scientific texts add you something to your former scientific knowledge?

Appendix 2

Teacher's Questionnaire:

The purpose of this questionnaire is to get information about the main difficulties that the 3 yearrd scientific stream students face in order to understand scientific texts.

Would you please help us to detect these difficulties by completing this questionnaire? (Put a cross in the right box)

I-Learning skills

1-Which of the four skills does the third year secondary school English textbook cover most?

Listening Speaking Reading Writing

II--Pedagogy:

Questions	Sometime	Yes	No
2-Does the new programme fit your students' level?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3--Does the 3 rd year English textbook incorporate some scientific texts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4--Does your reading lesson plan for scientific text look like that of any other type of text in terms of steps?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5-Do you set up activities that are typical to scientific English texts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6-Do you use a range of scientific tools (eg.pie charts, pictures, maps, ect..) to explain scientific information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7-Does the incorporation of such scientific tools help to a better understanding of scientific texts by your students?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9-If there is any difficulty, is it because of: -			
Your lack of scientific knowledge?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The weak level of your students?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Their lack of interest to English lessons in general?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Their lack of interest to scientific English texts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-The high technicality of scientific vocabulary?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-Apart from the scientific texts incorporated in the English textbook, do you adapt and even supply other texts that suit your students level, interest and motivation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 11-Do you ask a colleague teacher of a scientific discipline to help you explain any scientific concept encountered in the target scientific text?
- 12-Do you attend seminars that are relevant to scientific text reading comprehension?
- 13-Are scientific texts motivating for you?

III-Students' affective and cognitive state:

Questions

- | | Sometimes | Yes | No |
|---|--------------------------|--------------------------|--------------------------|
| 14-Are scientific texts motivating for your students? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15-Do you students fear the act of reading scientific texts? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16-Do they spend less time with tasks related to scientific texts? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17-Do the students struggle to understand scientific concepts? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18-Is this difficulty due to: | | | |
| -Their lack of prior knowledge? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - The technical scientific vocabulary? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| -Complex structure of scientific sentences? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19-Do they ask you to explain some difficult scientific terms? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20-Do they feel more motivated towards scientific texts when you: | | | |
| -Select more suitable texts that suit their level? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| -Explain texts using illustrations, graphs and pictures? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21-Do you praise your students when making an achievement in doing the different reading tasks? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Other comments

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The observation sheet

School: the secondary school of Mohammed Boudiaf	lesson : reading
Time of the observation: the end of the third term System	Unit : Astronomy and the Solar System
Class: 3 rd year scientific stream	
Teacher performer : the class English teacher	Teacher observer : The researcher

1-Teacher’s suggested tasks in the language classroom (reading comprehension activities)

Activity one: Reading the text and saying if the following statements are true or false

Activity two: Re-ordering ideas according to their occurrence in the text

Activity three: Answering Wh-questions according to the text

1-1Teacher’s observed behaviour :

	YES	NO
➤ Used L1 in conversation with the students	<input type="checkbox"/>	<input checked="" type="checkbox"/>
➤ Used L2 In conversation with the students	<input type="checkbox"/>	<input checked="" type="checkbox"/>
➤ Used English in conversation with the students	<input checked="" type="checkbox"/>	<input type="checkbox"/>
➤ Used pictures to clarify texts’ ideas	<input type="checkbox"/>	<input checked="" type="checkbox"/>
➤ used the board to explain some difficult terms	<input type="checkbox"/>	<input checked="" type="checkbox"/>

2-Students’ observed behaviour

	YES	NO
➤ Asked for translation of unknown words	<input type="checkbox"/>	<input checked="" type="checkbox"/>
➤ Used L1 in conversation with teacher	<input type="checkbox"/>	<input checked="" type="checkbox"/>
➤ Used L2 in conversation with teacher	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- Used English in conversation with teacher
- Referred to dictionary for unknown words
- Asked for grammatical explanations

2.1-Students' involvement in the different classroom tasks

Not very involved	-1	0	+ 1	Very involved
	/			

Table A: Students' involvement in the different classroom tasks

2.2-Students 'spent time with every classroom task

1st reading task	2nd reading task	3rd reading task
5 mns	5 mns	6 mns

Table B: Students 'spent time with every classroom task

3-Selected text qualities (hand out printed text)

3.1-Length of the text

not very long	-1	0	+ 1	Very long
			/	

Table C: Length of the text

3-2- text incorporated items (see appendix 3)

- | | YES | NO |
|---|--------------------------|--------------------------|
| ➤ incorporated illustrations | <input type="checkbox"/> | <input type="checkbox"/> |
| ➤ incorporated difficult words | <input type="checkbox"/> | <input type="checkbox"/> |
| ➤ incorporated long difficult sentences | <input type="checkbox"/> | <input type="checkbox"/> |
| ➤ incorporated new information for the students | <input type="checkbox"/> | <input type="checkbox"/> |

Appendix 4

Unit 3: Astronomy and the Solar System

Sequence 4: Reading and writing

The Universe is the totality of all space, time, matter and energy. Our earth is a tiny island of matter and energy, in the vast ocean of space time, which the universe is! Just as they say, truth is stranger than fiction and so it is with the universe. The things that our scientists have found in the vast realms beyond our planet are unbelievable and beyond imagination!!

Our solar system is a minute part of the thousands of galaxies surrounding the universe. Our solar system consists of the sun, planets, asteroids and several other bodies roaming around each other. Many people are still confused about the number of planets in the solar system. There were nine planets till 2006 but Pluto was taken out from the list and we have left only 8 planets. There are about 140 floating bodies known as natural satellites, also called moons.

Our solar system is an exciting place that consists of several celestial bodies, each having a number of interesting features. Although quite large by itself, the solar system is just a minute part of the vast universe. It is believed to be billions of years old. It consists of the sun in the centre and several other bodies including the planets in order, their satellites, asteroids, meteoroids etc. all revolving around the sun.

The Sun is considered to be the brightest star in our solar system. All the other eight planets in the solar system are in line with the sun. The solar system is divided in two parts, the inner solar system which consists of the Sun, Mercury, Venus, Earth, Mars, -satellites, floating bodies and asteroids. The outer system is made up of Jupiter, Saturn, Uranus, Neptune and Pluto (Not included in the solar system anymore) and comets.

Our homeland, the only planet in the solar system where life can sustain. A thin layer of earth's atmosphere separates us from the unlivable vacuum of space. You find water, land and air on earth. Earth is the third planet from the sun and the fifth largest from the solar system. The atmosphere consists of 78% nitrogen, 21% oxygen and 1% of other natural gases. The ozone layer present in the earth protects human life from the harmful UV rays coming from the sun. The moon is the natural satellite of the earth.

Do you know how many planets are there in the solar system? Most of us had studied in school that there are nine planets in the solar system. However, post 2006, Pluto was taken out of the list and is no more considered as a planet. It is now officially known as a dwarf planet. Thus, we now have only eight planets in our solar system. All these planets in the solar system differ widely in size from each other.