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Title

***The Implementation of Problem Solving Activities in EFL
Context: The Case of the Algerian Secondary School Exam
Classes***

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Dedications

To my family and friends

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Abstract

The present study investigates the development of problem-solving skills in English as a foreign language (EFL) among Algerian secondary school students preparing for the Baccalaureate exam. Following a socio-constructivist perspective, the research explored three key areas: (1) the alignment of current EFL curriculum, textbooks, and Baccalaureate exams with complex problem-solving; (2) EFL teachers' perceptions and attitudes towards integrating problem-solving in their classrooms; and (3) the effectiveness of Polya's problem-solving model in enhancing students' problem-solving abilities. The issue was investigated from different angles stressing triangulation. Indeed, a mixed-methods approach was employed, combining document analysis, a teacher survey, and an experimental study. The *New Prospects* textbook was evaluated using Bloom's and Quellmalz's taxonomies, the curriculum against Jung's 3C3R model, and the Baccalaureate exams using Spiro et al.'s cognitive flexibility theory and Marzano's taxonomy. Teacher perspectives were gathered through a questionnaire. The experimental group received instruction based on Polya's model. The control group included 30 students, whereas the experimental group included a total number of 36 participants. Results revealed limited integration of problem-solving in the evaluated materials, indicating that the curriculum incorporated key elements of the 3C3R model but did not emphasize problem solving. In addition, findings showed less than 20% of textbook activities and exam tasks explicitly targeting these skills. Teachers expressed positive attitudes toward problem-solving but reported challenges in its implementation. The experimental study demonstrated a statistically significant improvement ($p < .0005$) in problem-solving performance for students exposed to Polya's model ($M = 9.21$, $SD = 1.87$) compared to the control group ($M = 6.82$, $SD = 1.81$). These findings highlight the need for greater emphasis on problem-solving in the EFL context and suggest the potential benefits of incorporating structured problem-solving frameworks like Polya's model. The study offers recommendations for curriculum revision, materials development, and teacher training to better equip students with essential problem-solving skills.

Key Words: Problem Solving, Algerian Secondary School Exam Classes, Evaluation, Third-Year Secondary School program, EFL BAC EXAMS (Topic Two), New Prospects, EFL Teachers.

List of Acronyms and Abbreviations

CFT: Cognitive Flexibility Theory

CLT: Communicative Language Teaching

CBLT: Competency-Based Language Teaching

3C3R: 'content', 'context', 'connection', 'researching', 'reasoning', and 'reflecting'

EFL: English as a Foreign Language

p.: Page

PBL: Problem Based Learning

QCA: Qualitative Content Analysis

SD: Standard Deviation

SLA: Second Language Acquisition

SS: Secondary School

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GENERAL INTRODUCTION TO THE STUDY

Context of the Topic

The development of a society is to a large extent determined by its investment in education and instruction. The latter should aim at opening doors for individuals to perform at higher-cognitive levels of understanding via rich and diverse practices. However, reaching such an objective is not as an easy task as it seems. Indeed, a strong educational system based on powerful instructional tools, including human and non-human resources, is necessary. In this regard, learners are required, if they are to make meaningful use of knowledge, to be able to constantly experience new and moderately challenging problems, and look for ways to solve them effectively. The point is that problem-solving is a key component of 21st-century skills, vital in both academic and real-life contexts. In EFL education, it supports higher-order thinking and communicative competence, and it represents a way to better cope with the demands of everyday life whose main features are complexity and unpredictability. It is thus, for utility and significance of problem-solving in education that the researcher has decided to embark on such a field of inquiry and research.

Although the field of teaching and learning is ever changing, the primary objective of and interest to any educator, are uses of teaching materials, teaching techniques and procedures liable to help students attain a good level of performance when solving complex and life-like problems that require higher-order thinking skills such as reasoning and intelligence. Yet, despite the virtues claimed by scholars (Shell, 1990; Jonassen, 2000; Oon-Seng, 2003; Heine, 2010) for teaching problem solving, one cannot ascertain that stress is put on this skill in the Algerian Secondary Schools exam classes. This would be a worthwhile issue to investigate, mainly in such classes where students need to get involved in tasks that require them to approach and solve problems creatively.

A basic understanding of the processes of problem solving is fundamental for EFL teachers and test designers who intend to develop tasks that would have the potential to lead the students to effective practice of problem solving in classrooms. On the one hand, the designers of the English program, the textbook *New Prospects*, and the EFL Baccalaureate examinations designed for Third-Year Classes in the Algerian Secondary School, are responsible for stressing effective problem solving in the to-be-learned materials. The teachers, on the other hand, are required to be able to create a good problem-solving environment when implementing problem-solving tasks in the teaching/learning process.

At all instructional levels, it is important to store information in mind, but it is more important to be able to use and exploit the information in the resolution of novel problems at hand. Students need tasks which make them think and create solutions to new problems by making recourse to what they already know. Problem solving, a highly needed skill in instruction, is one of the pedagogical practices likely to permit the promotion of the learning of EFL by students. This is why one of the teaching major concerns for the educational system is the inclusion in the teaching/learning process of problem-solving tasks that require students to create their own solutions. This seems most closely related to the consideration of the range and types of problems that will have maximum utility in developing students' problem-solving abilities and at the same time will have the greatest transfer value for out-of-school activities, namely through written and verbal communication. In this regard, two resources are emphasized: the need for deliberate assessment techniques of the intended outcomes in terms of problem resolution, as well as provision of tools for teachers to enable their students deal better with problem solving or open-ended tasks when engaging in individual or group work.

Previous Studies

A set of previous studies have been carried out in the field of problem solving. At the international level, Chia and Hsu (2024) carried out an experimental study on creative problem solving in China entitled 'Effect of education based on creative problem-solving and asynchronous online discussions on student creativity in a product design course'. Their study revealed that students' creativity was greatly enhanced by creative problem solving. Their findings also showed that the students were encouraged by creative problem solving to get involved in deeper thinking skills when working in teams.

In a quasi-experimental study entitled 'Enhancing creative problem solving and learning motivation in social studies classrooms with gamified cooperative learning', Chaiyarat (2024) compared gamified cooperative learning with traditional cooperative learning in a study entitled that took place in Thailand. The results of the study revealed that both groups witnessed remarkable improvements in their creative problem solving and motivation to learn.

Another study on problem solving was carried out by An and Zhang (2024) in China with a title 'Effects of ability grouping on students' collaborative problem solving patterns: Evidence from lag sequence analysis and epistemic network analysis'. The findings obtained by the researchers suggested that creative problem solving was better observed in heterogonous groups.

In a study conducted in Australia entitled 'Problem solved, but how? An exploratory study into students' problem solving processes in creative coding tasks', Woo and Falloon (2022) examined how students' use of computational thinking and concepts kin to computer science to resolve problems in animated narratives. The authors concluded that computational thinking was not a condition for the production of valid creative coding outcome.

In an article entitled ‘Understanding student teachers’ collaborative problem solving competency: Insights from process data and multidimensional item response theory’, Gao et al. (2022) examined the features of student teachers’ competency when engaged in collaborative problem solving during two real online learning tasks in China. The study that took place in China demonstrated that ‘the bigram-indicator’ was reported to be more representative than the ‘unigram-indicator’ regarding student teachers’ collaborative problem solving competency.

Additionally, Phumeechanya and Wannapiroon (2014) carried out study in Thailand titled ‘Design of problem-based with scaffolding learning activities in ubiquitous learning environment to develop problem-solving skills.’ The authors reached the findings relative to the design as: (1) study of the content, (2) present the problem, (3) problem solving planning (4) problem solving, and (5) identify generalization and principles derived from studying the problem.

Lonergan et al. (2022) carried out a study in Australia entitled ‘Exploring the efficacy of problem-based learning in diverse secondary school classrooms: Characteristics and goals of problem-based learning’. The study took place in Australia. The researchers found that problem based learning was effective for knowledge enhancement.

In his article ‘Problem-based learning in the fifth, sixth, and seventh grades: Assessment of students' perceptions’, Azer (2009) demonstrated that PBL was perceived in a positive way by students in the fifth, sixth and seventh grades in Victoria, Australia. However, there were significant differences in perception between the grade levels.

Zhang et al. (2024), in their study ‘Effects of a problem posing instructional interventions on student learning outcomes: A three-level meta-analysis’ conducted in China revealed that Instructional interventions through problem posing enhances students’ thinking and creativity, as well as their involvement and motivation to learn through communicative

tasks. In addition, the authors demonstrated that these interventions impact positively the students' cognitive and non-cognitive skills.

At the national level, a Doctorate Thesis entitled: *Enhancing Problem-solving Skills and Motivation through Cooperative Learning The Case of Postgraduate Students, Department of Geology, University of Mentouri Brothers, Constantine* was carried out by Debache in 2016 at Mentouri Brothers University, Constantine. The study revealed that cooperative problem-solving helps learners develop problem solving skills through both deductive and inductive reasoning skills. In addition, the author showed that through cooperative problem-solving, learners' cooperative learning skills such as positive interdependent, face-to-face interaction, communication, and team working are enhanced when tackling issues with issues that require deep thinking and problem-solving skills.

At the national level, another study (A doctorate thesis) was carried out by Boudinare in 2020 titled *Using Problem-Based Learning Instructions in Stimulating Business Students' English Speaking Skills: A Case of Management Students at Commerce and Management Department -Setif 1 University*. The results reached by the author indicated that the integration of problem based learning in the Business English course effectively enhanced the speaking skills and sub-skills of Human Resources Management (HRM) first-year Master students in the Department of Management Sciences at the faculty of Commerce, Economics, and Management, Farhat Abbas Setif -1- University. In addition, the author found that the students had positive views towards the integration of problem based learning in the Business English course to enhance their speaking skill.

While previous studies have focused on teaching problem solving, no studies have been conducted to investigate the issue of problem solving in EFL classes preparing for their BAC examinations in the Algerian context. Indeed, according to the best of our knowledge,

no studies have been carried out to evaluate official teaching materials, gather teachers' views, and conduct experiments on problem solving.

Statement of the Problem

The Algerian third-year secondary school students, once they pass their Baccalaureate examination, need to start their journey at university with a cognitive potential in terms of analysis and evaluation that allows them to successfully display their problem solving skills in EFL through both spoken and written productions. However, in the Algerian EFL context, national exams focus heavily on rote learning and fixed-format questions, which limits the development of learners' cognitive flexibility and problem-solving abilities (See Herman et al., 1992, Wiggins, 1993). This lack of attention to problem solving in exam preparation may undermine learners' readiness for higher education and professional demands . Therefore, it is crucial to investigate the nature of the activities included in the Baccalaureate exams to assess their potential in fostering problem resolution. Such an analysis is essential for designing future exam formats that better equip students with the practical skills needed for their academic and professional journeys.

In addition, the nature of the studies that are carried out in EFL in the Algerian context still tend to be predominantly associated with issues regarding the teaching and learning techniques. While many studies have focused on language acquisition or teaching techniques (Henen, 2023, Debache, 2016) few have examined how EFL instruction cultivates problem-solving skills, particularly in the context of national assessment practices. This gap highlights a significant limitation in the current body of literature.

To address this gap, the present study seeks to explore the integration of problem-solving skills in Algerian EFL secondary school exam classes. Specifically, it evaluates the official curriculum and the textbook *New Prospects* to assess the extent to which they promote cognitive flexibility and problem solving. Additionally, the study incorporates a

survey of EFL teachers from selected schools in the provinces of Tizi-Ouzou and Bouira. The aim is to figure out the extent to which the teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom, as well as the different emerging roles and responsibilities associated with their views towards problem solving. By doing so, this research not only seeks to contribute to the underexplored area of problem-solving in EFL education in Algeria but also to provide insights for program design and policy development, fostering more effective language teaching and assessment practices.

Interestingly, the issue of the potential impact of the problem-solving models on the students' capacities to create solutions to new and complex problems has never been investigated in the Algerian context. As a result, the current research attempts to figure out, through experimentation, the impact of Polya's (1956) model on the problem resolution skills of the students preparing for their Baccalaureate examinations (Stream Literature and Foreign Languages).

It is to be indicated that the present study tackles the issue of problem solving in EFL context in the Algerian third-year secondary school from different angles. This requires a valid explanation of how each component (program, textbook, teacher perception, and Polya's model) relates to one another and contributes to solve the central problem. Indeed, the program is meant to offer a solid basis on which effective teaching and learning of problem solving is to be based. This can be done by stressing complex problem solving and the nature of language tasks to design for fostering students' creative faculties in terms of critical reasoning, analysis, and evaluation. The program should clearly call for teachers and BAC designers to stress cognitive flexibility.

Additionally, the evaluation of the textbook *New Prospects* in terms of problem solving principally aims at shedding light on the positive and negative sides of the material for the sake of providing recommendations for its improvement with relation to problem resolution.

Likely, the evaluation of the BAC exams in terms of complex problem solving is principally done to uncover the extent to which students' cognitive flexibility to solve complex language issues is stressed. This is a call for the BAC designers to cater for the skills that allow and encourage students to become creative problem solvers. The three components; that is, the program, the textbook, and the BAC exams relate to each other in that they all represent official teaching materials that should reflect the principles of effective problem solving in terms of ill-structuredness, newness (Jonassen, 2011), and cognitive flexibility (Spiro et al, 1988). As regards the teachers' views, this is meant to figure out the views that the teachers hold regarding the teaching and assessment of problem solving, as well as its benefits and the main difficulties for its implementation. This serves to solve the issue of improving the teaching of problem solving through the improvement of the teachers' practices regarding problem resolution. Finally, the experimentation attracts the attention of the teachers to the necessity of improving students' problem solving skills by using problem solving models like the one set by Polya (1967).

Research Objectives

This study investigates how the official program and the textbook *New Prospects* support problem-solving in Algerian EFL classes, evaluates teacher awareness, and examines the effectiveness of Polya's model in fostering problem-solving skills among Baccalaureate students. The present research principally aims improving the teaching and learning of this skill in the Algerian Secondary Education (Year Three). Five general objectives are followed in this research. The first aims at shedding light on the key theoretical issues about problem solving in general, and in connection with the teaching and learning of English as a foreign language in particular. The second objective relates to the evaluation of the English program and the assessment parts of the *New Prospects* designed for third-year classes in the secondary schools with regard to problem solving. Such evaluation is specifically intended to

sort out the weaknesses and the strengths of these didactic materials with a view to improving them through a variety of recommendations and suggestions. The third objective consists in investigating the extent to which EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom and the teachers' different emerging roles and responsibilities associated with EFL teachers' views towards problem solving. In so doing, a questionnaire was distributed to the teachers. The fourth objective is to evaluate the EFL BAC Exams (Second subject) in 'Literature and Foreign Languages' in terms of complex problem solving. Finally, the fifth objective is set to figure out the impact of Polya's problem solving model (1956) on the students' problem solving performance in two selected schools in Boumerdes province (Algeria). In a nutshell, the focal aim of this study is to bring a further insight into problem solving in the field of English language teaching and learning.

Research Questions and Hypotheses

In order to conduct the present research, a number of research questions and hypotheses will serve as landmarks to investigate the field under study. Accordingly, the following research questions and hypotheses are put forth:

Research Questions

- 1/ Do the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in the Algerian Secondary School cater for problem solving in a satisfactory way?
- 2/ To what extent do the EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom?
- 3/ What are the different emerging roles and responsibilities to be associated with EFL teachers' views towards problem solving?
- 4/ Do the selected EFL BAC Exams account for the EFL learners' cognitive flexibility to solve complex problems?

5/ Does the application of Polya's problem solving model have impact on the students' problem solving performance?

Research Hypotheses

To provide answers to the research questions, the following hypotheses are advanced:

Hypothesis One: Yes, the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in the Algerian Secondary School cater for problem solving in a satisfactory way.

Hypothesis Two: The EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom to a lesser extent.

Hypothesis Three: The different emerging roles and responsibilities to be associated with EFL teachers' views towards problem solving include the enhancement of the students' learning and the teaching practices.

Hypothesis Four: No, the EFL BAC Exams do not account for the EFL learners' cognitive flexibility to solve complex problems.

Hypothesis Five: H_0 (null hypothesis): The application of Polya's problem solving model does not have impact on students' problem solving performance.

Rationale and Significance of the Study

The significance of the present study is largely tied to its function to resolve a practical problem in the field of EFL in the Algerian context, and this by making use of its conclusions and recommendations. The potential value of the study is meant to serve students, teachers, researchers, as well as policy makers in the teaching and learning of English as a Foreign Language. At this stage, it is to be indicated that the study, throughout its parts and chapters, offers key theoretical and practical foundations and explanations that could be exploited in problem solving at both the national and international levels. Interestingly, while the previous studies have focused on teaching problem solving, no studies have been conducted to

investigate the issue of problem solving in EFL classes preparing for their BAC examinations in the Algerian context by evaluating official teaching materials, gathering teachers' views, and using experimentation on problem solving.

We believe that the present study is significant for the following reasons:

- 1/ According to the best of our knowledge, the study is the first to be carried out on problem solving in the Algerian context using new theories and approaches and new teaching materials
- 2/ The study incorporates a large set of aspects including: teachers' views, the evaluation of the official teaching materials (the textbook, the program, and the Baccalaureate Examinations) designed to teach English as a foreign Language for the Baccalaureate Exam Classes in Algeria, as well as an experimentation.
- 3/ The study findings may enlighten critical issues regarding the teaching and assessment of problem solving in EFL in the Algerian context.
- 4/ The large body of literature mentioned throughout the study may serve other researchers who are interested in the investigation of problem solving issues in EFL.

Methodology

The current research is a case study that seeks to investigate the implementation of problem-solving activities in EFL context: the case of the Algerian secondary schools exam classes. To reach the study's objectives, answer its research questions, and check the validity of its hypotheses, a mixed-method research combining quantitative and qualitative data collection and analysis procedures was adopted. The quantitative data, on the one hand, were gathered from a range of sources including: the textbook *New Prospects*, teachers' questionnaire, the BAC examinations, and the experimentation. On the other hand, the qualitative data were obtained from the open-ended questions of the questionnaire, the EFL program designed for BAC classes, as well as from the written performance of the control and experimental groups involved in the experimentation, which was carried out to figure out the

impact of Polya's problem solving model on the students' problem solving skills. For the analysis of the numerical data, two types of statistics were used: (a) descriptive statistics encapsulating the Statistical Package for Social Sciences (SPSS) and percentage formula using Microsoft Excel, and (b) inferential statistics incorporating the T-test. As regards qualitative data analysis, qualitative content analysis and thematic analysis were used.

Outline of the Thesis

The present thesis is organized around two main parts. Indeed, the thesis comprises a general introduction followed by two parts: (1) *Theoretical Underpinnings of the Study and Review of Related Literature*, and (2) *Presentation of the Methodological Approaches, Research Findings, and Discussion*. Part one includes two chapters. The first chapter reviews the literature on problem solving with the aim of discussing its definitions, types, importance, its complexity, and the variety of its forms and uses. A particular stress is put on the teaching and assessment of problem solving in English as a Foreign Language (EFL). The second chapter, on the other hand, delves into the review of EFL teaching materials evaluation whose foci would include: definitions of evaluation, types of evaluation, steps of evaluation, methods of evaluation, materials evaluation, and the importance of materials evaluation.

Part two incorporates five chapters. Indeed, the part portrays the methodological approaches and presents research findings in chapters three, four, five, six, and seven. The third chapter is methodological, and it presents the research techniques and procedures that the thesis adopts. The chapter explains data collection and analysis tools. The data collection tools include the corpus and the questionnaire designed for EFL teachers in some of third year-classes in Tizi-ouzou and Bouira (Algeria) so that to investigate the teachers' attitudes towards the implementation of problem-solving tasks in the classrooms. As to the data analysis procedures, they include qualitative content analysis (QCA), SPSS (Statistical Package for Social Sciences), the T-test, and Microsoft Excel. Chapter four is devoted to the

evaluation of the assessment parts of the EFL textbook *New Prospects* and the program in relation to problem solving. As to chapter five, it focuses on the presentation and analysis of the teachers' questionnaire. Chapter six deals with the evaluation of the EFL BAC Exams in order to figure out whether they account for the EFL learners' cognitive flexibility to solve complex problems or not. Finally, chapter seven is set to carry out an experimentation to study the impact of Polya's (1956) problem solving model on the students' problem solving performance.

These five chapters are to be developed in the light of the approaches and models that have previously been mentioned, and the review of the literature developed in chapter one and this for answering the research questions, as well as confirming or refuting the hypotheses set in the "General Introduction". Finally, the research ends with a "General Conclusion" which seeks to give a whole overview of the research. In this respect, a range of recommendations is provided in the sense to remediate the weaknesses of the evaluated materials, as well as the teachers' practices.

Part One:

**Theoretical Underpinnings of the
Study and Review of Related
Literature**

Chapter One: Problem Solving: A Literature Review

Introduction

The purpose of the current chapter is to review the literature on problem solving and on EFL teaching materials evaluation. Two sections make up the chapter. Section one intends to discuss the contributions of researchers and practitioners to the field of problem solving. To do so, the definitions of problem solving, its role in quality education, its approaches, and the typology of problems, as well as other themes pertinent to problem solving that will be considered.

I-1- Problem Solving: A Brief History

According to Moreno (2010), problem solving studies go back to the beginning of the 20th century, specifically to Thorndike (1913), Kohler (1929), and Dewey (1910). Similarly, Roth and Mc Ginn (1997) estimate that problem solving has been an educational pursuit at least since Dewey. This is chiefly tied to Dewey's (1938) notion of discovery learning through his appeal for educators to support learners acquire what they need in terms of cognitive abilities and skills for solving problems. Along similar lines, Novick and Bassok (2005) argue that it is in Gestalt psychology that studies on human problem solving have their roots. In that perspective, Lovett (2002) highlights that studies on the subject have their origins in Gestalt theory, as well as in information-processing theory. In a nutshell, it can be stated that problem solving has been a field of great interest in education since a long time.

Frederiksen (1984, p. 364) cited many cognitive researchers (e.g., Anderson, 1981a; Glaser, 1978; Klahr, 1976; Lesgold, Pelle-grino, Fokkema, & Glaser, 1977; Snow, Federico, & Montague, 1980a, 1980b; Tuma & Reif, 1980) who have shown that information-processing theory, theories of creative thinking, as well as psychometric theories of cognitive abilities are all involved in problem solving. This strongly implies that problem solving is fundamentally a cognitive process that accounts for the greater sense of thinking as the

cornerstone of more meaningfully organized knowledge to be built through effective resolution of complex problems.

In an article entitled 'Epistemology and the theory of problem solving', Goldman (1983) addresses the point that problem solving is the focus of two disciplines: 'philosophy of science' and 'cognitive science.' The former is 'critical' or 'normative', whereas the latter is 'descriptive' and 'explanatory'. Goldman adds that problem solving is fundamental in both artificial intelligence and cognitive psychology (p.22). Analogously, Laudan (1996) posits that problems solving is the concern of scientists and philosophers. On these grounds, it can be stated that problem solving relates to any discipline that is concerned with either intellectual or practical problems or both. The relevance of such clarifications to our study is that students of EFL need problem situations in which different levels and kinds of competence in the four languages skills should be displayed. Teachers can assess students by assigning them tasks that will elicit the development of their intellectual skills.

Many authors have treated the issue of problem solving from different angles. For instance, an important development in the understanding of how problems can be solved was the publication of Polya's *How to solve it* (1956), in which he describes a set of different stages that are involved in problem solving. In this respect, it is important to note that even if Polya's work is basically written for mathematics, the approach included in it on problem solving can be applied in different fields as in English as a Foreign Language teaching and learning.

To carry on with the history of problem solving, reference is to be made to Polya who highlights the importance of practice and imitation in problem solving. Indeed, Polya (1956) tells us that "Trying to solve problems, you have to observe and to imitate what other people do when solving problems and, finally, you learn to do problems by doing them" (pp.4-5). Three important elements figure in Polya's statement. Firstly, problem solving is a practical

skill that takes place by doing a set of tasks and activities. The second element involves practice and imitation suggesting that if learners want to develop their problem-solving abilities they have to observe models and then learn from them by trying out and practising the observed behaviors. Finally, Polya refers to learning by doing which entails that the problem solver is required to resolve problems through trial and error. On these grounds, it seems that Polya stresses two foundational concepts: learning through observation and imitation, and learning by doing. The former has relation with social cognitive theory, namely ‘observational learning’ (see Bandura, 1997) and the latter with experience-based learning (see Dewey, 1925, 1938).

After the decline of Gestalt psychology, research on human problem solving became weak. However, with the publication of Human problem solving by Newell and Simon in 1972 the field was renewed (as cited in Novick & Bassok, 2005). Newell and Simon built the “General Problem Solver (GPS)” standing for “a computer program that modeled human problem solving” (Ernst & Newell, 1969; Newell & Simon, 1972, as cited in Novick & Bassok, 2005, p. 324). It is, nonetheless, important to note that researchers acknowledged that “lack of domain knowledge” was a core drawback of GPS. The contribution of such a finding to problem solving in EFL is highly prescriptive as it emphasises the need for allowing students to get exposed to language tasks that prepare them to cope with particular situations through verbal and written communication. For instance, the English used in the domains of geography or tourism has its specificities which are different from General English. In this context, Shuell (1990) states that the traditional view of problem solving considered it as a set of “*general strategies*” but at the present time it is being thought as a range of domain-specific strategies.

The implication of the domain-specific knowledge for problem solving in EFL is that each language skill should be regarded as a specific field with its defining features. Besides,

the students should be provided with the necessary knowledge of each language skill through exposure to problem resolution in the target language. This can be fruitfully achieved and concretized by stressing the principles of constructivism, Communicative Language Teaching (CLT) and Competency-Based Language Teaching (CBLT). The main point invoked here is the importance of students' involvement in knowledge construction through effective communication, taking into account the students' various competencies (e.g. intellectual, methodological, and behavioral).

I-2- Approaches to Problem Solving

A set of approaches to problem solving exist in the literature. This includes the behavioral and the gestalt approaches.

I-2-1- The Behavioral Approach

Behaviorism is defined by Woollard (2010) as “a theory of animal and human learning that focuses upon the behaviour of the learner and the change in behaviour that occurs when learning takes place” (p.1). This implies that the learning outcomes according to the behaviourist theory are observable as they represent signs of behavioral change resulting from practice. In the context of problem solving, change in student's behaviour can be understood as a shift from not knowing how to solve problems to becoming able to solve them. Albeit this appears to be logical, it ought not to be regarded as definitely true because neglecting the role of the individuals' cognitive abilities in the process of learning such as memory, understanding, attention, and reasoning contradicts the canonical principles of the cognitive psychology proved through experimental research (Sternberg, 2009; Ashman & Conway, 1997; Stillings et al., 1995).

Problem solving was also a center of interest to some of the first behavioral studies. An illustrative example is Thorndike's research on cats in 1898 (as cited in Andre, 1986). According to Thorndike, the cats solved the problem of the box by “reinforcement and

extinction”; the cats, step by step, succeeded in getting rid of the actions that did not engender a solution and reinforced the one that permitted them to escape. This process was named by Thorndike “trial-and-error learning” (Campbell, 1960; Davis, 1973; Mayer, 1983; Skinner, 1966; Staats, 1966, as cited in Andre, 1986, p. 172).

Like Thorndike, Skinner viewed problem solving in terms of behavioral change whose reinforcement and strengthening occur accordingly. In more precise terms, if a response is strengthened it is likely to take place again. Skinner (1969) highlights that “The behavior which brings about the change is properly called problem solving and the response it promotes a solution”. Additionally, Skinner defines a problem as “a question for which there is at the moment no answer” (p.112). Shaped differently, the solution needs to be generated by the solver. Additionally, Woollard (2010) estimates that the key principle of Skinner’s operant conditioning is that “the more the association between the stimulus and the response is rewarded, the more sustained the conditioning and the more likely that the response will occur in the absence of the reward” (p.47). This is explicitly linked to reinforcement.

Skinner uses the terms extinction and reinforcement and he (1969) states: “Solving a problem is a behavioral event. The various kinds of activities which further the appearance of a solution are all forms of behavior” (p.121). Skinner’s definition of problem solving involves only what is observable without making reference to the individuals’ cognitive faculties. At this stage, it should be mentioned that problem solving is principally a cognitive process (e.g., Duncker, 1945; Jonassen, 2011).

The question that needs to be asked in relation to the precedent explanations of the behavioral approach on problem solving is: what are the implications for educators involved in this behaviourist research on problem-solving? To answer this question, it seems necessary to make reference to some general principles representing keys to success in all fields. The first principle entails ‘*making efforts.*’ By this it is meant that working hard to overcome and

get rid of what blocks the path to the solution is fundamental. This can be exemplified by how one succeeds in understanding the writings of Chomsky on language acquisition by making efforts to gather explanations provided by those authors who worked on the subject using different sources. The second principle regards the importance of *'perseverance'* in problem solving. The idea is that some problems can be so complex to the degree to push the solver to give up looking for their solutions. The third principle, and which is closely related to the second, is that of *'time'*. Shaped differently, in many situations problem resolution takes place after a long period of time, essentially in real-life problems, whose much expertise and know-how-to-do are crucial.

It is to be highlighted that the principles explained so far hold true in solving all types of problems incorporating problems to solve inside the classroom and those which occur in real-life situations. In brief, it can be supposed that though the behaviourist approach neglected the individuals' cognitive abilities in solving problems, the approach does provide important lines of inquiry that can be fruitfully pursued in EFL for the teaching and learning of problem solving.

I-2-2- The Gestalt Approach

Öllinger and Goel (2010) point out that the Gestalt psychology was developed by researchers (e.g. Wertheimer 1912, 1925, 1959; Koffka 1935; Katona 1940; Duncker 1945; Köhler, 1947) as a reaction to the behaviourist theory. In this respect, Sternberg (2009) contends that Gestaltist researchers stress *'insight'* in problem solving. This suggests that problem solving is viewed by the Gestaltists as a matter of sudden discovery of a solution. In other words, the solver does not go through a series of trial and error to meet the goal state; he/she rather comes to the solution suddenly or insightfully. Though insight can happen in problem solving, it cannot be a strategy on which individuals can rely. Argumentatively, in any teaching learning process students are intended to solve problems strategically and

systematically. For so doing, students need to be guided to how to use problem-solving methods effectively.

In the context of problem solving, Köhler (1929), a Gestalt researcher, carried out an experiment in which he put a chimpanzee in a cage and he concluded that the animal used “*insight*” to get the solution; that is, escaping the cage and getting the banana put outside. The way of solving problems found by Köhler was “controversial” to Thorndike’s trial-and-error (Moreno, 2010, p. 261). In a nutshell, Köhler views that problems could be solved by means other than trial and error; that is, by insight (Eysenck & Keane, 2005). It is, however, important to notify that the Gestalt approach does not provide principles that can be taught as problem-solving procedures. Reshaped clearly, research has not shown how to teach insight to solve problems and it is, thus, necessary to draw attention to its ineffectiveness in problem solving. This is because the Gestalt theory provided neither concrete teaching of procedures to solve problems, nor efficient ways to help learners become insightful (Schunk, 2012). Further evidence against the denial of trial and error in favor of insight in problem solving by the Gestaltists is the fact that there is a growing literature on learning by doing and experience-based learning that indicate the usefulness of practice and trial and error in learning and problem solving (See Dewey, 1925, 1938).

Following the Gestalt principles, emphasis was on “understanding”; that is, in solving problems comprehension is necessary and that “rote” learning remains ineffective and cannot be considered as being useful in handling everyday-life problems (Schunk, 2012, p. 300). Unquestionably, this is due to the fact that rote learning is not based on understanding which is one of the most important principles to consider in the deciphering of data to use in solving problems, namely world-like problems.

Maier, the Gestalt researcher, carried out an experiment to investigate the role of reconstruction and insight in problem solving. Maier’s problem is known as “two string” or

“pendulum problem”. Such experiment was considered as evidence of “problem restructuring”. As stated by Maier, the clever solution was generated by reorganizing and reconstructing the problem (as cited in Eysenck & Keane, 2005, pp. 434-435). The implication of reconstruction for solving problems in foreign and second languages is twofold: the students can reorganize the problem statement and elements mentally as well as by writing. However, it is generally important to make recourse to writing so that things become clearer and more organized. In plain terms, writing helps to get a more visible picture of the problem and, as a result, a good conception of the way leading to goal attainment will likely take place.

The following points by Ohlsson (1984a) and Wertheimer (1954) sum up the Gestalt theory:

- Problem-solving behaviour is both reproductive and productive.
- Reproductive problem solving involves the re-use of previous experience and can hinder successful problem solving (e.g., as in problem-solving set and functional-fixedness experiments, see later).
- Productive problem solving is characterized by insight into the structure of the problem and by productive restructurings of the problem.
- Insight often occurs suddenly and is accompanied by an “ah-ha” experience (as cited in Eysenck & Keane, 2005, p. 433)

The implications of the Gestalt theory on problem solving for education in general and foreign language teaching and learning in particular is twofold. Firstly, the understanding of the problem is vital in solution generation. This can, for example, be stressed by EFL teachers to show their students the importance of understanding the exam questions before starting to get down their answers on the examination papers. Secondly, by restructuring the problem, the solver can see which way can lead to the final state. Problem restructuring has a close

relationship with problem understanding. In other words, it can be the key to comprehend the problem and thus be able to figure out the necessary actions permitting the transformation of the initial state to the goal state.

I-3- Definitions of Problem and Problem Solving in the Literature

The examination of the diversity of literature on problem solving shows that various definitions of the concept have been provided by a number of scholars (e.g., Duncker, 1945; Polya, 1962; Shaftel & Shaftel, 1967; Shuell, 1990). The intent then is to uncover the very sense of problem solving embodied in those authors' definitions, and the implications such definitions might have for EFL teaching and testing.

To discuss the issue of problem solving, a good starting point might be the question: What actually is a problem? Answers to such a question provide a key to the study and investigation of the subject. It is, thus, important to consider definitions of 'problem solving' jointly with those of 'a problem'. In this vein, Carter (1988) draws attention to the necessity of getting the meaning of a problem for a good understanding of problem solving. Indeed, in criticizing the information-processing model of cognitive psychology that neglected what a problem is, Carter (1988, p. 552) writes: "I suggest that we cannot fully understand problem solving until we fully understand what a problem is; the concept of problem must be at the heart of any theory of problem solving." The quotation shows that knowing what a problem is will, according to Carter, inevitably influence the understanding of problem solving. More importantly, problem understanding should lay the groundwork for any problem solving theory. Two main arguments can support this point. One is that there is overwhelming evidence which shows that researchers on problem solving develop models whose "problem understanding" usually represents the initial stage (e.g., Wallas, 1926; Polya, 1956; Bransford & Stein, 1993, Sternberg, 1999). The second argument is that the statement "the concept of problem must be at the heart of any theory of problem solving" falls in with common sense.

Shaped differently, all the steps involved in problem solving ought to cater for what to do to reach the goal state, which in turn is determined by the solver's understanding of the problem.

Jonassen (2011) notes that “the word “problem” derives from the Greek *problema*, meaning obstacle”, and that a problem is synonymous with “dilemma,” “quandary,” “obstacle,” “predicament,” and “difficulty” (pp.1-2). A scrutiny of this polysemous list brings into light two inherent features of a problem: its ‘difficulty’ and its ‘open-endedness’. The former invites the solver to make recourse to his/her cognitive abilities such as reasoning, intelligence, creativity, and critical thinking all along the problem-solving process, while the second suggests that there is no one single relevant solution to a problem. For example, in school environments, students can be told about the importance of deep thinking as the key to intellectual products whose main tenets are: ‘novelty’ and ‘diversity’. The students need to try again and again. What matters is the active role of students in learning and not answers to previously encountered problems. Consequently, a crucial principle in education should be made visible: “open-ended questions plant in people open-mindedness.”

It is worthwhile indicating that the definitions of problem solving that will be presented in quotations will inevitably add value to the research, as they get the reader in touch with the meaning of problem solving as it was originally expressed by the authors. The quotations can therefore no longer be a matter of random choice, but fundamentally become evidence about the clarity, validity and reliability of the research.

To begin with the definitions of problem solving, Duncker (1945) starts his monograph, *On problem solving*, with a part whose title is: “Introduction and Formulation of the Problem” in which one can read:

A problem arises when a living creature has a goal but does not know how this goal is to be reached. Whenever one cannot go from the given situation to the desired situation simply by action, then there has to be recourse to thinking. (By action we

here understand the performance of obvious operations.) Such thinking has the task of devising some action which may mediate between the existing and the desired situations (p. 1).

Duncker argues that problem solving is not tied to immediate solution generation. Problem solving, rather, involves the solver's thinking abilities necessary for the creation of appropriate ideas to be used in problem resolution. This would suggest that Duncker's definition embodies an implicit set of key terms and expressions that are closely tied to problem solving such as 'imagination', 'intelligence', 'creativity', 'reasoning', 'critical thinking', 'decision making' and 'mental representation of the problem'. In a nutshell, the definition excludes routine and mechanical activities from problem solving and represents problem solving as a complex skill.

Another definition of problem solving that portrays it as a highly distinguished human activity is given by the mathematician Polya (1962) writing:

Solving a problem means finding a way out of a difficulty, a way around an obstacle, attaining an aim which was not immediately attainable. Solving problems is the specific achievement of intelligence, and intelligence is the specific gift of mankind: solving problems can be regarded as the most characteristically human activity (p. ix).

A set of key terms such as 'difficulty' and 'obstacle' are incorporated in Polya's definition. The task of the teacher then is to raise awareness that solving a problem mainly means overcoming hindrances. In this regard, Polya (1962) contends that "where there is no difficulty there is no problem" (p.117). It is, however, important to draw attention to the point made by the National Council of Teachers of Mathematics (NCTM) (1989) that a problem "should be complex enough to offer challenge but not so complex as to be insoluble" (as cited in Lewis & Smith, 1993, p. 132). Delisle (1997, p. 17), likewise, warns "a problem that is too easy or too difficult will not further students' growth." Therefore, problems should be

appropriately challenging and not immeasurably tricky, so as to keep students far from negative issues that are usually more psychologically-generated such as demotivation and anxiety. ‘Intelligence’ is another key term in the definition. Intelligence is mainly mirrored in handling new problem situations. Last but not least, problem solving is the most valuable human performance because it is the product of the highest-cognitive skills that humans possess.

Interestingly, Shaftel and Shaftel (1967) provide a very explicit definition of problem solving where they insist on risk-taking in problem solving training:

In essence this view of problem solving conceives of it as a discovery process, a search—one that often requires creative thinking and the eventual synthesis of many ideas. Such a procedure does not flourish in a school environment that emphasizes only the “right” answer and that is based on the intellectual authority of the teacher. It requires an atmosphere in which it is safe to speculate, to *guess*, to test out ideas even at times to be wrong. It is a search in which all notions are respected for try-out, then critically evaluated for their consequences. Problem-solvers need a zest for exploration; they need to learn to really listen to each other’s ideas before accepting or challenging counterproposals (p. 44).

In Shaftel and Shaftel’s definition “discovery learning”, as a learning approach, is eluded. Richards and Schmidt (2010) state that this constructivist approach allows learners to “develop processes associated with discovery and inquiry by observing, inferring, formulating hypotheses, predicting and communicating” (p.176). In order for that to happen, the teaching process should be based on principles whose focus is on learning issues that trigger students’ curiosity and creative faculties. In addition, for Shaftel and Shaftel problem solving is a process that involves higher-cognitive skills, mainly ‘creative thinking’ and ‘synthesis’ which serve to elicit open-ended questions rather than close-ended ones. In the former type of

questions, students, as mentioned in Shaftel and Shaftel's definition, are allowed "to speculate, to guess, to test out ideas even at times to be wrong"; whereas in the latter type, the students are called on to give "right" answers. Finally, Shaftel and Shaftel highlight the necessity of respecting others' ideas and evaluating them objectively and critically. This can be fostered by constructive interaction among problem solvers.

Shuell (1990) links the existence of a problem to the situation when someone attempts to reach an objective following a set of alternative steps, and that the beginning is generally not successful. He sees problem solving as: "a goal directed activity that requires an active search for and generation of possible alternative actions and decision making as to which course of action to follow next" (p.102). Included in this process is the cognitive evaluation of the practicability of different alternatives. The solver, then, proceeds to the verification of the alternative he/she has selected to check its effectiveness (Shuell, 1990, p. 102). The definition set out by Shell, if implemented, is likely to lead to solution generation as it underlines the basic components of effective problem solving, mainly sound decision making, deep thinking, and cognitive evaluation. Such components reflect, to a large extent, intellectual maturity.

In line with the aforementioned definitions, Jonassen (2011) defines a problem as "a question or issue that is uncertain and so must be examined and solved" (p.1). What can be deduced from this is that any question or issue whose path to solution is not direct or obvious stands for a problem, and the solver, in consequence, needs to examine the problem and generate its solution. The very idea here is that problems are featured by 'uncertainty' and 'difficulty.'

A careful consideration of the definitions provided by Duncker, Polya, Shaftel and Shaftel, Shell, and Jonassen indicates that problem solving concerns only new and creative problems whose solutions cannot be generated mechanically. As evidence, Bransford and Stein (1993) rightly affirm that "most theorists' definitions of 'problem' assume that it is

nonroutine”(p.7). More importantly, all the definitions tap into higher-level thinking as a cornerstone in problem resolution. This is why problem solving is viewed as a kind of thinking (Mayer & Wittrock, 2009), a ‘cognitive process’ (Jonassen, 2011, p. 3), or as “a mental, or cognitive, activity” (Goldman, 1983, p. 31).

Following the previously discussed definitions, students could be asked to handle new issues such as laziness and what should be done to overcome it in EFL classes, taking into account the students’ learning abilities. This has deep implications for instruction in the sense that teachers need to look for ways that might enable students to become productive thinkers; something which is best manifested through solving complex problems. Teachers, too, are called on to provide their students with rich content to learn through like discussions that are based on logical thinking and reasoning. And as far as problem solving in EFL classes is concerned, debates on open-ended questions and novel issues among students seem to be promising. Resultantly, the implementation of the ideas incorporated in the definitions in teaching and assessing problem solving in EFL classes should be done with many great care and efforts. The idea is that there should be a careful consideration of the instructional objectives and the assessment activities to ensure that they meet the students’ needs, and that they are reliable, and achievable with regard to the students’ learning abilities and time limits. Teachers, as well, need to be professionally competent.

On the basis of the two types of problems: ‘intellectual’ and ‘practical’, a problem is defined as a ‘question’ and the ‘answer’ as a ‘solution’ by researchers who have dealt with intellectual problems and they, therefore, have defined problem solving as a “question answering” (Goldman, 1983, p. 31). In addition, Goldman has considered problem solving as “a mental, or cognitive, activity”. That is to say, problem solving is an activity involving the use of cognitive processes as thinking and reflection in the generation of solutions to the to-be-solved problems.

Problem solving has been defined by Mayer and Wittrock (2006) as a “cognitive processing directed at achieving a goal when no solution method is obvious to the problem solver” (as cited in Mayer & Wittrock, 2009, p. 702). The central issues addressed in the definition are the solver’s role in creating solutions to novel problems relying on his/her cognitive abilities, as well as the idea that problem solving is a goal-directed activity which requires the solver to make use of an effective problem-solving strategy; one that involves the utilization of both propositional and procedural knowledge. Mayer and Wittrock’s definition taps into a set of elements that are necessary in solving problems including: reflection, analysis, creativity, critical thinking, and evaluation. That is to say, all that requires students to manifest a personal product attained by creating individual solutions rather than through doing mechanically designed activities.

In defining problem solving, Bartee (1973) writes in his article “A Holistic View of Problem Solving” that it is “is the activity associated with the change of a problem state to a solution state” (p.439). Bartee’s definition implies that the problem solver is in search for a solution through a process that allows the transformation of the original state by illuminating the obstacles to attain the desired state. What lacks in Bartee’s definition is to specify what kind of change is involved in problem solving: a simple or a complex change.

Dealing with the definitions of problem and problem solving, it is to be noted that the present research builds on the view that problem solving is a high and complex cognitive skill (Gross & McDonald, 1958; Palumbo, 1990; Shuell, 1990; Brookhart, 2010; Heine, 2010; & Schunk, 2012). As an illustration, Heine (2010) clarifies that problem solving research enquires the ways humans create solutions for complex tasks that cannot be solved immediately. With this in mind, teachers become more aware that for problem solving to take place there are going to be cases where students will need more time to think and reflect on the alternatives to provide. This seems to be problematic as the process of problem solving

might become time consuming. Two solutions can be suggested to handle this situation: one is to stress the instructional objectives which are the most meaningful to students, and the other is to teach students the methodological skills as, for instance, how to manage time and set outlines appropriately.

In associating problem solving with higher-order thinking skills, Lewis and Smith (1993), for example, note that "...a broader term than critical thinking is needed to include problem solving,- critical thinking, creative thinking, and decision making. The term higher order thinking is proposed here as such an encompassing term" (p. 136). It follows from this that solving problems is a challenging cognitive task that involves a set of skills that go beyond the mere application of declarative knowledge. And as regards the meaning of higher-order thinking skills, Lewis and Smith (1993) articulate that higher order thinking takes place when new information is joined with the old one to be used extensively to create answers in complex problematic situations. The definition excludes from higher-order thinking skills any task that does not involve a resolution of a complex problem situation. It is the complexity of the situation that pushes the solver to make recourse to deep thinking to deal with issues whose solutions are not immediately attainable.

In the context of shedding more light on the very sense of problems that allow for the occurrence of problem solving, it is indicated by Brookhart (2010) that "for problems that require higher-order thinking, the solution strategy is not immediately apparent. Problems that require higher-order thinking are nonroutine problems" (p.100). In EFL classes, therefore, stress should be on effective communication through which novel issues are debated and discussed. The students at this level need to provide sound explanations for their own analysis. To make it clearer, teachers can ask students to deeply analyse the causes of divorce and how to solve this societal problem.

Of the most defining features of problem solving is that it is both a thinking and creative skill. Schunk (2012), for instance, argues that solving problems “does not take place when students’ skills become so well established that they automatically execute actions to attain goals” (pp.299-300). This implies that it is necessary that the tasks in which the students are involved stress knowledge production rather than reproduction, and that evidence can be provided that the solutions generated can be justified and explained through sound arguments. As a result, the inferences to draw from the students’ knowledge are primarily indicators of mastery of a set of skills that go beyond a simple recall of information stored in permanent memory. If this is done, it is possible to create a very enjoyable learning environment where students feel that they can perform intelligently.

It should be indicated that there are situations “when solving problems is not problem solving” (Shuell, 1990, p. 103). Such statement is of a great value in that it attracts attention to the importance of deep learning through which the students’ intellectual powers become more visible. As a result, what is required in problem solving is critical reasoning blended with an effective problem-solving strategy. This, nevertheless, requires a strong education system in terms of good administration, good teachers, well-developed teaching materials, enjoyable classroom settings, and effective teaching and assessment methods.

In line with what has been discussed above, it was argued by Anderson (1980) that three elements are characteristics of problem solving activity, which are paraphrased as follows:

- The problem solver is directed towards satisfactory goal-attainment.
- A range of cognitive skills rather than a unique skill are required for solution generation.
- Problem solving is to be based on thinking and not on mechanical processes (as cited in Eysenck & Keane, 1993, p. 131).

I-4- Problem Solving and its Relationships to Other Concepts

As a way of reviewing of problem solving, it seems important to draw connections to other skills which have a close relationship with the concept including: metacognition, reasoning, decision making, critical thinking, and creative thinking. Each of these related concepts will be discussed separately.

What should be borne in mind is that there is a range of terms about thinking processes which are tied to problem solving. Indeed, according to Mayer and Wittrock (2009), “reasoning, decision making, critical thinking and creative thinking are subsets of problem solving, that is, kinds of problem solving” (p. 703). Thinking involves the cognitive process of a problem solver and it refers to both “*directed thinking*” as problem solving and “*undirected thinking*” like “*daydreaming*”. As a result, it seems here that problem solving can be regarded as a subset of thinking and more particularly as a directed thinking (Mayer & Wittrock, 2009, pp. 702-703).

To begin, reasoning denotes “problem solving with a specific task in which the goal is to draw a conclusion from premises using logical rules based on deduction or induction” (Mayer & Wittrock, 2009, p. 703). In addition, about reasoning Schunk (2012) refers to different authors as Anderson (1990), Johnson-Laird (1999), Hunt (1989), Ennis (1987), and Quellmalz (1987). In Schunk’s writings about the authors, one can read that Anderson (1990), for example, notes that reasoning relates to the intellectual effort responsible for creating and assessing the relevance and acceptability of arguments. Also, Johnson-Laird (1999) states that reasoning is a means to state what can be the results of ideas, conceptions, and what someone believes to be strongly true. In addition, Hunt (1989) indicates that reasoning is used to explore problems and justify why something occurred and what will occur.

Decision making, in its turn, refers to problem solving in which the solver should make a decision about which solution of two or more alternatives to choose relying on

specific criteria. For example, a teacher should make a decision about the kind of works students should be involved in: individual, team, or group work. As a result, reasoning and decision-making represent instances of problem solving that are featured by particular types of tasks (Mayer & Wittrock, 2009). In this vein, attention should be drawn to the fact that decision making has nothing to do with guessing; because the persons who make the decision should respect well-established criteria permitting them to justify their choice (s).

Last but not least, creative thinking and critical thinking are related to particular “aspects of problem solving”. To mention it clearly, creative thinking relates to the generation of “alternatives that meet some criteria” whereas critical thinking deals with the evaluation of “how well various alternatives meet some criteria.” For instance, “in scientific problem solving situations, creative thinking is involved in generating hypotheses and critical thinking is involved in testing them” (Mayer & Wittrock, 2009, p. 703). In addition, Shuell (1990) shows that closely tied to problem solving are critical thinking and decision making.

Moreover, it is to be mentioned that the study of problem solving is closely linked to cognitive psychology, which also covers so many concepts of which we find metacognition. The latter helps deepen our understanding of the functioning of problem solving as it gives insights to the understanding which is, as it has been mentioned in the previous sections, a core element in the process of searching for solutions to problems. As regards the definition of metacognition it is “one’s ability to monitor, evaluate, and make plans for one’s learning” (Tobias & Everson, 2000b, as cited in Tobias & Everson, 2009, p. 107).

In the present study, the inclusion of this part dealing with the examination of the concepts that are related to problem solving can be justified as follows:

1/ In the field of problem-solving, drawing clear cut distinctions between these concepts helps recognize those activities belonging to problem solving and those which do not. In other terms, if an activity requires simple choices to find out its

solution, it becomes clear, thus, problem solving is not involved. But, if an activity requires decision making to find out the solution, here it can be said that problem solving is involved to less or more extent. That is to say, it depends on the kind of the decisions to make.

2/ Being aware of the interconnectedness between problem solving and the concepts discussed so far involves having a clear understanding of what problem solving means. That is, having a clear idea about when someone is really involved in solving problems.

I-5- Categorization of Problems in the Literature

Various types of problems have been identified in literature, namely ‘routine problems’, ‘new problems’, ‘well-and-ill-structured problems’, ‘intellectual problems’, and ‘practical problems’. In presenting such categorization, the hope is that students in the Algerian Terminal classes will be provided with even better learning opportunities in EFL through effective teaching and assessment of problem solving, which is soundly based on the best choice of problems.

The categorization begins with the distinction that Reitman (1964) created between well and ill-structured problems. Indeed, problems were categorized by Reitman on the basis of how information is distributed within three constituents: “start state, goal state, and the transformation function” of the problem-solving process. The idea is that if the information about the constituents of the problem “vector” is not complete or present, the problem, then, is said to be ill-structured, and if it is complete the problem is considered as well-structured (as cited in Öllinger & Goel, 2010). It is useful to mention here that the notion of ‘transformation function’ refers to the actions to be taken by the solver to bridge the gap between the initial state and the goal state.

Frederiksen (1984) in his article “Implications of Cognitive Theory for Instruction in Problem Solving” has shown that ill-structured problems do not have “a clear formulation, a procedure that guarantees a correct solution, and criteria for evaluating solutions” (p. 366). In the same article, Frederiksen cited Simon (1978) who provided features of ill-structured problems that are paraphrased as follows:

(a) ill-structured problems are featured by more complexity and provide little parameters to know when the problem has been resolved.

(b) ill-structured problems do not have the whole required information for producing their solution.

(c) ill-structured problem do not have a fixed process leading to their solution.

Problem solving as a process that focuses on ill-structured problems is gaining interest in the field of instructional design (Jonassen, 1997, as cited in Lohman & Finkelstein, 2000). At this point it is convenient to infer that because solving well-structured problems does not guarantee the development of students’ educational skills to face real-life situations, educationalists have felt the need to focus on ill-structured problems as stimulators of cognitive growth and skill development of students. Obviously, the ill-structuredness of problems in itself does not guarantee such cognitive and skill development because a big challenge to educators is the establishment of an education culture that offers the most favorable conditions in which the students consciously pursue the benefits of solving problems creatively.

A critical aspect of ill-structured problems is that people hold multiple, and sometimes conflicting perspectives of the nature of the problem, procedures for solving it, and appropriate solutions (Chi & Glaser, 1985; Kitchner, 1983, as cited in Lohman & Finkelstein, 2000, p. 293). Moreover, Rittel and Weber (1974) have noted that ill-structured problems in most cases cannot be given true or false answers, though “*better and worse*” solutions can be

generated to them. On the contrary, well-structured problems can be given true and false answers (as cited in Öllinger & Goel, 2010, p. 13). It is at this point that the teaching of divergent thinking should become the major concern of teachers because this kind of thinking allows students to discover the existence of a wide range of solutions to ill-structured problems and, thus, focusing attention to the necessity of diversifying the assessment criteria of the students' outcome, as well as the procedures of solving the problems.

Given the provided explanations of ill-structured problems, it may be tempting to conclude that in solving such type of problems four questions are practically inevitable: (a) What should be done to get a clear formulation of the problem? (b) What information should be sought for to solve the problem? (c) What would be the appropriate method to solve the problem? And lastly (d) What criteria determining appropriate solutions? All these questions do not have straightforward answers. That is, the solver needs to make efforts to answer them drawing on his/her declarative and procedural knowledge.

By contrast, well-structured problems can be solved following a straightforward way. All the information about the problem is present. A concrete example is solving the problem of getting the plural of words such as 'woman', 'girl', 'pen', 'street', and 'wolf' by putting respectively 'women', 'girls', 'pens', 'streets', and 'wolves'. The procedure by which this problem is resolved is the same for all individuals. At this stage, it is perfectly acceptable to say that in solving the problem of plural forms convergent thinking is stressed.

In solving real-world problems, nonetheless, the constraints are "nomological", in that they relate to society, politics, economy, and culture. Such constraints can be qualified as being "intentional" and as tools permitting us to structure our lives. Further, these constraints are not "definitional or constitutive" because we can negotiate or break them according to situations (Öllinger & Goel, 2010). What is being invoked here is the embodiment of ill-structuredness and flexibility in real-life problems as two basic features. As a result, teaching

students how to solve ill-structured problems which look like real-life problems might, to a larger extent, prepare them to become good performers who face real-life problem situations flexibly and intelligently. The biggest challenge, however, is the concretization of such problem-solving culture in classrooms.

It is important to mention that ill-structured problems are ill-defined and well-structured problems are well-defined. Moreover, problems can be classified as either “well-defined” or “ill-defined”. In well-defined problems the desired state, the way leading to the solution and barriers to solution are clear (Pretz et al., 2003). In this vein, a very useful point to mention is that a problem can be well-defined to a person and ill-defined to another owing to their differences in the information they have about the problem (Robertson, 2001, pp. 8-10). To this point, one can add differences in individuals’ cognitive abilities and experience. In the article “Epistemology and the Theory of Problem Solving” by Goldman (1983), problems have been classified into ‘intellectual’ and ‘practical.’ In this light, Goldman has argued that intellectual problems are almost involved in any practical problem. There is, here, an explanation that puts our finger on an essential point: the foregoing division of problems by Goldman, well understood and seriously considered, permits to say that in solving intellectual or practical problems cognitive skills such as understanding, intelligence, evaluation, creativity, and reasoning are, to a greater or lesser extent, involved. Hence, the basic idea underlying Goldman’s division of problems is that there are two foundational components of the problem solving: theory and practice.

Interestingly, there are ‘simple’ and ‘complex’ problems. In this vein, Jonassen (2024) points out that complex problems entail “multiple variables during problem structuring and solution generation places a heavy cognitive burden on problem solvers” (p. 5). The operations are related to higher-cognitive skills in terms of analysis, synthesis, and evaluation

(Moseley et al. 2005). This allows have important insights into the nature of complex problem solving in that it requires higher-cognitive operations for solution generation.

As regards the amount of knowledge to be used in solving problems there are, on the one hand, problems which can be solved with very little knowledge and they are called “*knowledge-lean problems*” and, on the other hand, problems that require a lot of knowledge and they are known as “*knowledge-rich problems*” (Robertson, 2001, pp. 10-11).

A set of procedures can be followed in classifying problems. One procedure is to consider the kind of solutions the problems require. An illustrative categorization is the following:

1. *The prior knowledge required to solve them;*
2. *The nature of the goal involved;*
3. *Their complexity;*
4. *Whether the problem tells you everything you need to know to solve it, or whether you need to work out for yourself what you are supposed to do;*
5. *Whether it is the same as one you’ve solved before;*
6. *Whether it needs a lot of working out or whether you can solve it in one step if you could only think what that step was* (Robertson, 2001, p. 6).

Interestingly, a major step towards classifying problems is the development of a taxonomy resting on principles determining the types of skills involved in solving problems (Reed, 2007). In this respect, three types of problems were listed by Greeno (1978): ‘arrangement’, ‘inducing structure’, and ‘transformation’. First of all, in arrangement problems the solution is obtained by arranging things in a relevant way. Secondly, unlike arrangement problems the relation between objects in inducing structure problems exists and the solver is asked to find it out as in “series extrapolation” and “analogy problems”. As regards “transformation problems,” they involve “an initial state, a goal state, and a sequence

of operations for changing the initial state into the goal state” (Greeno, 1978, as cited in Reed, 2007, pp. 304- 307).

I-6- The Importance of Problem Solving

Developing students’ abilities to become efficient problem solvers is foundational in education (Mayer & Wittrock, 2009). Likewise, Popper (1972) contends that “science starts from problems (rather than from observations or even from theories ...” (p. 181). Popper clearly indicates that problem posing is the source of knowledge. This is quite reasonable because human actions, either relative to observation or to the development of theories, are generally stimulated by the need to solve problems. Additionally, Jonassen (2000) views that “problem solving is generally regarded as the most important cognitive activity in everyday and professional contexts” (p.63). This invites teachers to involve students in new problem situations that might motivate them to work creatively to improve instruction and learning. This, however, should occur jointly with the teachers’ guidance to drive students to perform coherently and methodologically. The second main reason is to anticipate many of the problems which EFL students and teachers alike are likely to encounter during the teaching learning process with respect to problem solving.

According to Carter (1988), “problem solving is an epistemic act, a way of learning, of coming to knowledge” (p. 554). The idea which deserves consideration in this definition is that it is advantageous to have an education system that promotes students’ understanding of problems and learning about the various problem-solving procedures. By doing so, students draw on the key principles of problem solving through which new solutions can be generated, and valuable evidence of understanding can be provided.

The ability to solve problems is undoubtedly of capital importance for both individuals and groups, especially in present societies whose complexity is noticeable. As a result, there is a general agreement that learning how to solve problems is in our times a basic instructional

goal (De Corte, 1990, p. 5). It, then, becomes necessary to stress the acquisition of procedural knowledge that would help solve complex problems. Again, Schunk (2012) maintains that problem solving is one of the most important kinds of ‘cognitive processing’ in instruction, and this specifically with the development of cognitivist learning theories. One possible explanation of Schunk’s claim is that the cognitivist learning theories provide the various underpinnings of the higher-cognitive processes such as analysis, synthesis and evaluation that might allow students to use their thinking for problem resolution.

Being closely related to higher-cognitive processes, effective problem solving takes place when students perform to reach high academic standards. For instance, Resnick (1987 as cited in De Corte, 1990) used the dichotomy ‘low literacy’ and ‘high literacy’, and he classified the acquisition of problem solving ability as belonging to the second dichotomy. Said differently, Resnick’s dichotomy alludes to a highly valuable principle in instruction which is intellectual maturity that embodies the various advanced academic standards in terms of mastery and know-how-to do. As a result, it is the task of the educational stakeholders to accompany learners all along the instructional process till they reach “high literacy”. In this respect, in an article entitled “Implications of Cognitive Theory for Instruction in Problem Solving”, Frederiksen (1984), has cited Williams and Hollan (1980) who have pointed out that problem solving is one of the most essential cognitive skills to be taught at all levels of education. This literature clearly indicates the value and significance of problem solving in instruction and that neglecting it might lead to instructional bankrupt. In this regard, Trilling and Fadel (2009) writes that 21st century skills include:

- Critical thinking and problem solving (expert thinking)
- Communication and collaboration (complex communicating)
- Creativity and innovation (applied imagination and invention) (p. 49).

They added “These skills are the keys to unlocking a lifetime of learning and creative work” (p. 49). Highlighted in the statement is the necessity of pursuing the 21st century skills in any domain as they pave the way to progress and success, essentially in the modern times. In EFL contexts, the success of students’ achievements can be measured against those skills. To the point, programs that target the skills ought to be linked to teachers’ everyday practices.

This discussion, hence, does suggest that problem solving can be fruitfully studied and implemented in the field of EFL teaching and learning. The biggest challenge at this stage, however, is: what kind of decisions should be made in order to reach such a goal? The answer is that political, economical, and instructional decisions should be made. The evidence is that there is no instruction that exists in isolation. That is, the impact of political and economical decisions on the quality of instruction in any field is undeniable and this becomes more visible in the learning environment, and the teaching materials and methods that policy makers provide the learners and teachers with (See Williams & Burden, 1997).

I-7- Problem Solving Methods

Important historical insights into problem solving as a cognitive process include: “trial and error, insight, and heuristics”. Trial and error is originally linked to Thorndike’s (1913) experiment with cats (Schunk, 2012, pp. 299-300). With regard to insight, Gestalt psychologists claim that a great deal of what is learned by humans is ‘insightful.’ Problem solvers arrive at solutions in a sudden manner or insightfully (Lemonick, 2003, as cited in Schunk, 2012, p. 300).

In addition to what has been said so far about trial and error and insight, problems can also be solved by “heuristics”. In this regard, “a heuristic is a general rule that is usually correct. In problem solving, a heuristic is a strategy in which you ignore some alternatives and explore only those alternatives that seem especially likely to produce a solution” (Matlin, 2009, p. 365). Contrarily to trial-and-error methods, heuristic ones strengthen the likelihood to

reach the goal state as they allow solving problems following a specific plan and they can be used in various content fields (De Corte, 1990).

A number of researchers have proposed general problem-solving methods in terms of heuristics. For instance, the following steps have been suggested by Polya (1957):

- Understand the problem.
- Devise a plan.
- Carry out the plan.
- Look back.

Polya's model locates the solver's mental engagement at the heart of the problem solving process. The model, in fact, starts with a stage at which the solver needs to exactly know what he/she is required to do. It is this stage which determines the success of the problem-solving process. Differently shaped, if the solver understands the problem, he/she is likely to attain the goal by taking the promising actions. After this stage, the solver engages in setting a plan that might facilitate the generation of alternatives. The stage "carry out the plan" requires the solver to concretize his/her ideas. Finally, in the fourth step of the model, reflection is foundational. In other words, the evaluation of the effectiveness of the solution allows the solver to deeply learn about the nature of problem solving and the solver's task becomes diametrically cognitive in nature.

Like Polya, Bransford and Stein (1993) have developed the following model that they call the IDEAL approach to problem solving:

I= Identify problems and opportunities

D= Define goals

E= Explore possible strategies

A= Anticipate outcomes and Act

L= Look Back and Learn (p. 20).

The first stage relates to problem identification, as well as to the positive attitudes that problem solvers need to have towards problems. Positive attitudes can be of a great psychological support as the problem solvers' perceived self-efficacy in problem solving will increase. Conversely, negative attitudes can impede the solvers' enthusiasm to deeply think about the ways leading to the goal state. The second component is related to goal setting, in that the solver is called on to have a clear idea of what he/she wants to get. The third stage indicates that there is no one method for solving problems and the solver's task is to try out potential procedures leading to a solution. Stage four relates to expecting probable results in solving the problem, as well as taking the necessary actions following the strategy chosen. Finally, the solver examines the results of his/her actions and the lessons to learn from the process of solving problems. This is related to learning by doing.

A careful examination of the two models explained hitherto reveals that both put students at the center of problem solving. They are, as a result, in line with the principles of the student-centered approach under which students are encouraged to perform autonomously and dynamically. Additionally, one practical advantage of the models is that they are not complicated. In fact, teachers can use them with higher-achieving and lower-achieving students. These are the main reasons for which they appear to be ideal for teaching problem solving. This holds true for EFL teachers and teachers of other disciplines.

In addition, the following four phases have been offered by Wallas (1926) in his book, *The art of thought*:

Preparation- It refers to data collection and first trials to solve the problem. Metaphorically, the ideas representing keys to open the doors leading to solution generation should be produced by the solvers relying on their background knowledge and the data they have at hand about the problem. For in doing so, productive thinking should be stressed.

Incubation- the problem solver stops working on the problem for a while;

Illumination: the solution path becomes visible; it is the stage of “the flash of insight” or “aha”.

Verification: the correctness of the solution is verified (as cited in Mayer, 1977, pp. 65-66 with my emphasis).

The model proposed by Wallas is “descriptive”; it was not checked through experiments; it remains purely theoretical (Schunk, 2012, p. 300). In comparing between Wallas’ stages and Polya’s steps, Mayer (1977) writes:

Polya’s steps are similar to Wallas’ in general form. Polya’s “understanding” step is similar to Wallas’ preparation phase, his “devising plan” step includes some of Wallas’ preparation phase and both the incubation and illumination phases, and the “carrying out the plan” and “looking back steps” relate to Wallas’ verification (p. 67).

By drawing on a number of authors (Bransford & Stein, 1993; Hayes, 1989; Pretz, Naples & Sternberg, 2003; Sternberg, 1986), Sternberg (2006) presents the problem solving cycle as incorporating the following steps:

- 1- Problem Identification
- 2- Definition of problem
- 3- Constructing a strategy for problem solving
- 4- Organising information about problem
- 5- Allocation of resources
- 6- Monitoring problem solving
- 7- Evaluating problem solving (p. 430).

One would observe the importance accorded in the cycle to the solver’s awareness of the existence of a problem by putting it as the first step. If problems are sufficiently identified, their definition, which bears importantly on the students’ background knowledge, determines the nature of the strategy that would lead to solution generation. It, then, matters the solver’s responsibility to gather the information relative to the problem by consulting the relevant sources as, for instance, written or audio-visual data. The sixth stage of the cycle designates the solvers’ task to consider their decisions and actions by stressing the ones which are likely to lead to the goal state. After generating solutions, solvers need to evaluate their

effectiveness. This may well be done by contrasting the solution to established criteria and principles of the field in which the solver is performing.

Schoenfeld (1985) developed one of the most illustrative models of heuristics in mathematics science. The model has five stages. Firstly, the problem solver is engaged in “analysis oriented” task, wherein he/she tries to comprehend the problem by representing it appropriately. Secondly, a general outline to reach the goal state is drawn by the solver. In the third step which is “exploration oriented” the problem solver transforms the initial situation into a routine one. This is the most foundational step of this heuristic model. Fourthly, the outline to get the solution is executed. Finally, the problem solver checks the correctness of the solution. In this vein, it is to be mentioned that though Schoenfeld model was essentially developed in the field of mathematics, its stages can be applied in solving problems in the field of language teaching and learning (as cited in De Corte, 1990, p. 8). Indeed, Schoenfeld model is akin to Polya’s model.

The examination of the large existing literature on problem solving indicates that the stages which constitute the process of problem solving are a matter of consensus and they are four. Being aware of the existence of a problem is the first step. Secondly, the solver is concerned with data collection to become familiar with the problem solving task and the means leading to the goal. The third stage is “a hypothesis formation stage in which the solver formulates solutions”. The fourth involves the evaluation of the solutions (Gross & McDonald, 1958, p. 262).

The possibility of teaching heuristic methods with success has been demonstrated by research in different content fields. It is, however, important to indicate that it exists in the literature about this field views that show that the acquisition of heuristics specific to a given content field does not automatically mean that the problem solving abilities of those persons in other content fields will be ameliorated (De Corte, 1990).

The importance of heuristics in solving problems lies in the fact that they provide a straightforward way to solution. Another feature is that they include the basic steps towards solving problems effectively. In addition, they stress the importance of the cognitive abilities of the solvers, essentially understanding and evaluation. In brief, it can be said that heuristics are like a map that might, to a great extent, allow the solver to reach the goal state.

In addition to what has been explained so far, focus is on the investigation of the key methods that can be used as characteristics of good problem solvers. In other words, how can we distinguish between good and poor problem solvers taking into account these features as criteria for evaluation? According to Whimbey and Lochhead (1999), there are various features that researchers investigated to qualify any problem solver as being good. These features can be categorized into five types.

The first characteristic to mention is '**positive attitude**' and which denotes that good problem solvers powerfully believe that "careful, persistent analysis" is a necessary step to go through to get solutions to "academic reasoning problems". Contrastively speaking, bad problem solvers do not approach problems analytically; that is, they basically rely on guessing. There is also the point that poor problem solvers do not regard confusion as an obvious feature that a problem can have when it is approached for the first time, and they ignore the importance of breaking down problems into smaller parts for analysing them gradually.

The second characteristic is '**concern for accuracy**'. The idea is that a great care is taken into account by good problem solvers in a complete and accurate manner for an effective understanding of "the facts and relationships in a problem". In most cases, good problem solvers are powerfully interested to figure out whether their understanding of the problem is accurate and complete. This is a characteristic that poor problem solvers lack. For instance, in some cases effective problem solvers read a problem again and again so that they

become sure they comprehended it. Contrarily, ineffective problem solvers usually do not manage to solve problems because they do not comprehend them. Nevertheless, it is useful to indicate that poor problem solvers could manage to effectively solve problems if they give importance to accurate thinking and careful analysis.

As regards the third characteristic, it relates to **‘breaking the problem into parts.’** It has been learned by effective problem solvers that dividing ideas into smaller parts is salient in order to analyse complex problems. They approach problems from an angle that permits them to have an understanding of it and, then, moving forwards to get a full sense of it. Poor problem solvers, on the other hand, do not consider the gradual analysis of problems as being essential.

The fourth characteristic is **‘Avoiding Guessing’**. That is to say, poor problem solvers are not able to judge their answers as being accurate or correct. Indeed, they rely on intuition and guessing; avoiding to proceed in the problem solving process step by step. In some cases, judgments based on intuition are made by them in the mid-way of the problem solving process. In other cases, poor problem solvers approach the problem only partially, and later on stop looking for relevant answers and opt for guess work. On the contrary, effective problem solvers lean towards approach problems from start to finish by following well considered and small steps (Whimbey & Lochhead, 1999, pp. 25-27).

The poor problem solvers’ avoidance of solving problems through the required steps and their tendency to not find correct answers can be explained by three essential points already mentioned. The first point is related to the fact that poor problem solvers do not consider “persistent analysis” as a key feature in the problem solving process. That is to say, they do not stress the worth of “academic reasoning problems”. Secondly, ineffective problem solvers are not careful in their reasoning. They do not evaluate the correctness of their answers in an ongoing way. Finally, they have not acquired the skill to progressively solve

problems; something which shows how poor problem solvers skip steps (Whimbey & Lochhead, 1999, pp. 26-27).

The last but not least feature of good problem solvers is ‘**activeness in problem solving.**’ This means that good problem solvers are active in looking for solutions when dealing with “academic reasoning problems” following different ways. Poor problem solvers, however, lack this characteristic. For instance, a good problem solver relates difficult problem situations to already experienced ones through comparison and analogies (Whimbey & Lochhead, 1999, p. 27).

Of what types of skills a problem solver is called on to have mastery in order to effectively and successfully solve problems? It has been indicated by the review of the rich literature about the subject that three kinds of skills should be mastered by a competent problem solver:

- 1- The problem solver is required to flexibly apply “*a well-organized domain-specific knowledge base, involving concepts, rules, principles, formulas, and algorithms*”
- 2- *The use of heuristics; that is, analyzing and transforming problems using strategies (procedures) systematically.*
- 3- “*Metacognitive skills*” including knowledge about “*one's own cognitive functioning on the one hand, and activities that relate to the self-monitoring and regulation of one's cognitive processes on the other*” (De Corte, 1990, p. 7).

Consequently, we can say that the relevance of these characteristics to our research can be justified in this way:

1. These characteristics are related to academic reasoning: The idea here is that in the field of instruction and education, good problem solvers can be recognized through the use of these characteristics as criteria. Conclusively, our research which enquires the issue of

problem solving in the Algerian Secondary schools exam classes will make use of the characteristics through data analysis sections.

2. These characteristics deal with advanced cognitive levels, mainly analysis and evaluation: As it has previously been indicated, good problem solvers carefully and accurately analyse problems. Likewise, they stress the importance of breaking down larger problems into small units so that to understand problems. Also, it should be remembered that the analysis level is considered in the literature as a cognitive stage which is tightly linked to problem solving. Similarly, evaluation which is the most advanced level in the thinking process (see, for example, Bloom's taxonomy and Quellmalz' framework developed in the coming parts) is directly related to problem solving; because, being able to evaluate the correctness and effectiveness of solutions is intended to elicit students' problem solving performance.

3. The characteristics call on the problem solvers to avoid guesswork: One of the weaknesses that should be avoided in the field of testing in general, and in testing problem solving in particular is guessing. More clearly, the problem-solving process should principally be based on reasoning, and more precisely on inductive reasoning (see the previous part) which is the opposite of intuition. Ultimately, the aforesaid characteristics qualify any question or activity that can be solved through guessing as not belonging to problem solving.

I-8- Problem Solving and the Different Types of Knowledge

Two types of knowledge are involved in problem solving: 'propositional' and 'procedural' (Shuell, 1990). To the point, Palumbo (1990) posits that declarative knowledge addresses "specific facts, concepts, and principles" whereas procedural knowledge denotes "active, strategic use of the declarative knowledge base when solving problems." Declarative knowledge is theoretical and is about the 'know-what', whereas procedural knowledge is both theoretical and practical and it is the 'know-how' (p. 66). By way of illustration, the problem

of pollution requires both declarative knowledge about, for example, its symptoms and procedural knowledge on how to illuminate the various complex pollutants generated by industrialization such as carbon dioxide and other types of chemical gases.

Discussing the inclusion of declarative and procedural knowledge in problem resolution, there is an important aspect which deserves consideration; there is a vast difference between knowing the types of knowledge that solving problems necessitates and being able to make use of the types to create solutions. The idea is that problem solving is a practical skill (Polya, 1956) that requires an active involvement of students when doing problem-solving tasks.

In order to solve new problems background knowledge is needed. When an unfamiliar problem is faced, the problem solver might begin setting hypotheses and evaluating them to choose the one which works. Different types or 'domains' of knowledge are involved in such strategies and they are, in a nutshell, called 'domain general.' There are problems, however, which need specific knowledge that functions only in that specific problem situation and in which 'domain specific' strategies are required (Robertson, 2001, p. 7).

It, then, seems advisable to link these explanations and illustrations of declarative and procedural knowledge to situations requiring students to make use of what they have learned in terms of propositional knowledge to generate solutions to a range of new and complex problems (procedural knowledge). In the context of EFL, teachers need to value particular settings in which they can support students individually or in pairs to boost the students' abilities in resolving new problems by displaying what they can competently perform when speaking or writing in English.

In problem solving, experience and background knowledge are crucial. Indeed, these two elements affect problem representation and how one proceeds to find solutions to problems. Insufficient knowledge is generally considered as the source of the different

obstacles that novices face when solving problems (Shuell, 1990, p. 105). Likewise, the importance of previous knowledge in facilitating problem representation is indicated by Glaser (1984, as cited in Robertson, 2001).

Additionally, Polya (1956) argues that teachers should take into account the students' background knowledge ('experience') and capacities in solving problems. In line with this, Pretz et al (2003) estimate that it is on the basis of what one has already learned that he/she comes to identify, define and represent a problem. As individuals differ in their background knowledge, they will approach problems in a different way.

An aspect of problem solving that has paramount implications for instruction is that individuals do not solve problems in the same way and with the same cognitive abilities. This leads to classify problem solvers into experts and novices. For instance, Palumbo (1990) indicates that the differentiation between novice and expert problem solvers is one of the most important points discussed in problem-solving literature. On the differences between expert and novice problem solvers, it is stated by Larkin (1980) that experts proceed in solving problems by using the needed data in more effective and broader "chunks" and novices, on the other hand, use narrower and less efficacious pieces of information (as cited in Palumbo, 1990, pp. 68-69). In addition to their mastery of heuristics, expert problem solvers are highly skilled in domain-specific knowledge (De Corte, 1990, p. 9).

The implications of the principles underlying domain specific knowledge and problem solving for language teaching and learning can be understood in terms of the importance to give to the mastery of the various language skills. For instance, one can mention mastery of vocabulary, pronunciation, listening strategies, grammar, and the different writing techniques. Therefore, language teachers need to focus on what helps students build specific knowledge of the different skills of the target language. This of course needs to be based on the use of the

relevant teaching strategies and techniques taking into account the students' motivation and needs.

To better show the distinctions between novice and expert problem solvers, the following points by Schunk (2012) are paraphrased:

- Have larger declarative knowledge
- Posses better systematic knowledge organisation
- Give more importance to knowledge analysis and planning
- Are more competent in problem formats recognition
- Have deeper level problem representation
- Are more careful in achievements monitoring
- Have better understanding of the importance of solving problems strategically

The previous discussion suggests that the efficacy of experts in solving problems can be viewed as mastery that one can reach through practice. Teaching problem solving, therefore, requires a good methodology stressing the importance of learning by doing and time in acquiring experience.

The importance of highlighting the differences between experts and novices in solving problems lies in the fact that the background knowledge of the solvers should be taken into account, as well as the difficulty of the problems to be solved. That is, experts and novices do not have the same cognitive potentialities in facing different problem situations. As a result, in schools, for example, teachers are required to consider their students' intellectual level when involving them in problem solving. For example, it is not appropriate to ask first year students of English at university to solve problems of literature that master two students view very difficult. In brief, if this is not considered by teachers, it will highly likely lead to students' demotivation.

Additionally, it is to be indicated metacognitive is crucial in problem solving. According to Baker (2009) the literal meaning of ‘metacognition’ is “cognition about cognition”, or in its informal sense, “thinking about thinking” (p. 604). In other words, problem solvers ought to stress that kind of thinking which tends to increase responsiveness when approaching problems. Flavell (1976; as cited in Baker, 2009) defines metacognition as “knowledge about cognition and control of cognition” (p. 604). The element “knowledge about cognition” entails the knowledge that someone possesses about cognition, involving what a learner knows about him/herself, about the features of the task to be done, as well as the required strategies to do the task efficiently. On the other hand, “the control component” relates to the way one plans, evaluates the process of doing the task, as well as the way to overcome any possible problems that emerge when doing the task.

The importance of metacognitive knowledge and skills in solving problems effectively has been indicated by recent studies. The first aspect of metacognitive knowledge involves being aware of what one is cognitively able or unable to do. By way of illustration, when we know that our capacities of memorizing different forms of knowledge are limited and that such a situation can be remediated by using, for instance, “mnemonics” as a technique to facilitate memorization. The second aspect of metacognitive knowledge; that is, self-regulation has as a function to regulate and control our cognitive processes and acquisition of knowledge. Of the skills included in self-regulation we find outlining a set of procedures to attain the goal state, following a continuous control of the procedures, assessing the correctness of the solution, and considering the activities involved in one’s learning and solving problem (De Corte, 1990, p. 11).

About the importance of metacognition in problem solving, Norman (1980) has written:

It is strange that we expect students to learn yet seldom teach them anything about learning. We expect students to solve problems yet seldom teach them about problem

solving. And, similarly, we sometimes require students to remember a considerable body of material yet seldom teach them the art of memory. It is time we made up for this lack, time that we developed the applied disciplines of learning and problem solving and memory. We need to develop the general principles of how to learn, how to remember, how to solve problems, and then to develop applied courses, and then to establish the place of these methods in an academic curriculum (as cited in De Corte, 1990, p. 11).

The quotation casts light on a set of principles that need to be emphasized in instruction in general and in problem solving in particular. The principles are in fact related to learning how to learn, learning how to memorize knowledge and learning how to solve problems. This can be seen as a policy that covers the focal elements dealing with learning by principles rather than learning by heart. At this stage, it is vital to draw attention to the idea that at the centre of the principles lays metacognitive knowledge.

I-9- Teaching and Assessing Problem Solving in EFL

EFL students need to be taught the basic principles of effective problem solving. The students, too, need to be assigned tasks that require them to produce creative solutions stressing analysis, evaluation, and critical reasoning.

I-9- 1-TeachingProblem Solving in EFL

Students' learning is enhanced by two coalescent elements: teaching and assessment (Gronlund & Brookhart, 2008). Nonetheless, successful and efficacious teaching and assessment are fundamentally determined by the quality of the instructional objectives (e.g. see Drumheller, 1974; Greeno, 1976; Gronlund, 2004; Gronlund & Brookhart, 2008 ; Woollard, 2010). On this point, Woollard (2010) articulates that "objectives are the foundation upon which learning sequences can be built, and they are also the foundation for assessments" (p. 69). This underlines the canonical role of instructional objectives in

education. With this in mind, the teaching materials like syllabi and textbooks should stress objectives that favor problem solving. And for describing how the instructional objectives should be, Woollard uses the acronym SMART standing for:

- Specific
- Measurable
- Achievable
- Reinforceable
- Timely

Firstly, the objectives are specific in that they target students' output and tell them the particular performances they should exhibit after each period of instruction. Secondly, measurable objectives delineate the students' achievements that are inventorial and recordable in a concrete way. Thirdly, achievable objectives mean that they appropriately fit the students' learning abilities. Fourthly, 'reinforceable' objectives allow teachers to teach and assess them with flexibility. Fifthly, the objectives "should be timely in terms of frequency, duration and occurrence" (Woollard, 2010, pp. 69-70). Henceforth, the most noticeable advantages of the instructional objectives lie in the fact that they lay the foundations for good lesson planning and meaningful and organized instruction with its two inseparable aspects: teaching and assessment. Conclusively, on the basis of the importance of problem solving which has already been highlighted and examined, the instructional objectives should be designed in the sense to improve students' abilities in problem solving.

The classic distinction between "learning by rote and learning by understanding" made by Max Wertheimer (1959) has deep implications for the teaching of problem solving. The idea is that the rote method of instruction is useful in getting good results on "retention tests", and bad results on "transfer tests" (as cited in Mayer & Wittrock, 2009, p. 705). The underlying argument in favor of learning by understanding is that it allows students to know

the very sense of principles and how to make use of them for constructing novel solutions. Students, above all, can argumentatively justify their actions and decisions when engaged in problem resolution. Conversely, the final goal of rote learning is to get students reach high academic standards in extensive declarative knowledge. As a result, it can be stated that if learning by understanding is really emphasized by teachers, the teaching methods and the assessment practices might likely enable students to become competent problem solvers. By way of illustration, in the teaching and assessment of argumentative essays, the explanation of the various elements of this kind of composition through clear examples should be at the center of teachers' practices.

For teaching problem solving, Polya's Model (1973) and Bransford and Stein's Model (1993) can be used by teachers to guide their students towards a systematic and strategic problem resolution. This needs to be joined with frequent formative assessment in order to ensure an appropriate and effective assimilation of the approaches by the students.

In an article entitled "Problem Solving in the Classroom", Henton et al. (1979) insist that to teach problem solving, it is necessary to create situations in which students deal with "a new question", use information synthetically, as well as proceed by trial and error. Again, the students ought to acquire the ability to evaluate acceptable and unacceptable solutions. What needs clarification, however, is that for the strategies set by Henton et al. to be effective, tasks need to be clear, stimulating, achievable, authentic, and benefic for students inside and outside classroom contexts. More importantly, Robertson (2001) explains that in solving problems in any content area, it is necessary to make a decision about the "choice of process" as the first step to make. As a result, the aforementioned models developed by Polya, as well as by Bransford and Stein may prove very helpful in problem solving instruction.

As to the teaching approach that can be used to best teach problem-solving, Lohman and Finkelstein (2000) assert that frequent exposure to PBL (problem-based learning) may

allow students to have more chances for experiencing and practicing basic facets of problem solving. This statement pinpoints to the idea that it is in the context of problem-based learning that problem-solving can be promoted and this by experiencing and taking recurrent actions in solving novel and ill-structured problems. In this vein, Goodman (2008) writes that “problem-based learning is a teaching method that encourages active learning by students” (p. 255). This active learning can be understood in terms of the students’ involvement in building new knowledge.

As mentioned earlier, problem-based learning goes back to “the progressive movement”, and more particularly to John Dewey who held that students should be taught by attracting their “natural instincts to investigate and create.” The development of PBL was originally for training adult doctors to create solutions to “*medical problems*” (Delisle, 1997, p. 1). In a similar vein, Goodman (2008) noted that PBL started in schools of medicine where stress was on real-life and complex problems.

The Canadian physician, Howard Barrows, pointed out that for doctors to be competent they “must have both knowledge and the ability to use it” (Barrows 1985, p. 3, as cited in Robert, 1997, p. 2). This means that to be a competent problem solver, stress should be on declarative knowledge and on practical implementation of such knowledge in handling with problem situations. Though this was said in the medical context, it, nonetheless, has significant and deep implications for teaching problem solving in any instructional field. In teaching English as a foreign language, for instance, focus should be on teaching students the four language skills handling with challenging and new issues. In a nutshell, students should know about the language and be able to perform with the language by solving complex problems. At this point it is to be mentioned that the term ‘problem situations’ is defined by Jonassen (2011) as “uncertain situations for which no resolution is immediately known” (p. 1). This implies that problem situations call on the solver’s creative thinking to resolve them.

As to the effectiveness of PBL, Delisle (1997) puts forth a set of principles of which we single out the following:

- *Problem-based learning deals with problems that are as close to real-life situations as possible.*
- *problem-based learning promotes students' active engagement with learning.*
- *Problem-based learning promotes an interdisciplinary approach (pp. 8-13).*

Interestingly, Duch et al. (2001) state that PBL aims at enabling students to:

- *think critically and be able to analyze and solve complex, real-world problems*
- *find, evaluate, and use appropriate learning resources*
- *work cooperatively in teams and small groups*
- *demonstrate versatile and effective communication skills, both verbal and written*
- *use content knowledge and intellectual skills acquired at the university to become continual learners (p.6).*

It is to be indicated that the choice of problem-based learning as an approach under which students can be involved in effective problem solving has been made for two main reasons. The first reason is that such an approach is constructivist (e.g., see Schunk, 2012) bearing in mind that in a constructivist perspective students are encouraged and guided to dynamically and strategically build knowledge. With regard to problem solving, this can be understood in terms of creating solutions to problems requiring higher-cognitive processes. The second reason is concerned with 'heterogenous classes', in that problem-based learning enables students with mixed learning abilities to successfully perform in the classroom (e.g., see Delisle, 1997). In many situations 'heterogenous classes' can impede the process of teaching and learning in general and that of problem solving in particular. Nonetheless, by giving each individual student the opportunity to take risk and to try out his/her alternatives, the instructional process, as a result, might flow smoothly.

Four issues that are involved in designing a problem-solving course have been designed by Mayer (2008). The first issue “what to teach” addresses the point whether problem solving should be taught as a unique, “monolithic” skill or as, a set of component skills. Though “conventional wisdom” views problem solving as being a single skill, investigations in cognitive science propose that problem solving ability involves a gathering of smaller, component skills. The second issue “how to teach” is whether focus should be on the problem solving outcome or result. Investigations carried out in cognitive science suggest that stress should be put on the process of problem solving rather than on its product. That is to say, effective problem solving is fundamentally related to the application of good problem solving methods, effective decision making regarding data collection and analysis, as well as the right actions to be taken for solution generation. The third issue which is “where to teach” refers to whether problem solving should be taught as “a general, stand-alone course or within specific domains”; such as problem solving in geography and languages. To this point, cognitive science suggests that “it would be effective to teach problem solving within the context of specific subject domains.” The last issue “when to teach” relates to the idea whether problem solving should be taught before or after students have learned lower-level thinking skills. Though it appears to be logical to teach students lower-order thinking skills before higher order thinking skills, investigations in cognitive science suggest that “it would be effective to teach higher-order skills before lower-level skills are mastered”(Mayer 2008, as cited in Mayer & Wittrock, 2009, p.705).

Many scholars have indicated that procedures of general problem solving can be taught. For example, Glaser (1979) holds that it is possible to learn “the strategic knowledge” required for solving problems. Thus, “instructional research” should explore the strategies for teaching “procedural problem-solving skills” (as cited in Frederiksen, 1984, p. 376). The same idea has been phrased by Simon (1980) in the following terms: “In teaching problem solving,

major emphasis needs to be directed towards extracting, making explicit, and practicing problem-solving heuristics-both general heuristics, like means-end analysis, and more specific heuristics” (as quoted in Frederiksen, 1984, p. 376). As this quotation illustrates the teaching and learning of problem solving should be based on clear and sound strategies be they general or specific. It follows from this that students should be taught how to approach problems strategically and what kind of actions should be taken when making use of the strategies. This needs practice and a promising learning environment where students perform dynamically.

Nevertheless, it is proposed by Greeno (1980) that learning “well-organized procedural networks for specialized domains may be more useful than general planning procedures” (as cited in Frederiksen, 1984, p. 376). It follows from this that the very benefits of instruction are mastery and deep understanding and not shallow comprehension of the instructional objectives. The value of instruction is determined by the efficiency of its methods to provide students with higher-problem solving skills in their specialized domains such as languages, mathematics, and history.

For the sake of understanding more about problem solving in an academic context, Bloom and his colleagues (1947) carried out a study that involved students with varied academic results: “A or B” and “D and F”. The first source mentioned by the researchers was the “understanding of the nature of the problem”. The students with low marks could not adequately concentrate to understand the nature of the problem. In addition, the students read the problems in the wrong way, quickly, in an incomplete manner, and with lack of concentration. The second source was “attitude toward problems and problem solving” in that the poorer students were not confident in dealing with problem solving successfully. The third was the “understanding of ideas contained in the problem”. The students did not have the ability to comprehend the problem when the problem presentation did not resemble that

they studied. The fourth related to the “General approach to the solution of problems” in that the students did not follow an efficient method in solving problems.

Bloom and his colleagues investigated the ways to change the problem solving methods used by weak students. The students, after practicing problem solving during different months, they solved problems stressing reasoning, with confidence, by dividing problems into sub-problems, and by following a systematic way. They, too, ameliorated their capacities of problem analysis and often they followed a set of criteria to choose the best solution among the alternatives. Additionally, they read problem statements with concentration and objectivity. Consequently, the remedial students remarkably improved their marks and achievements.

The central point to emerge from the investigation done by Bloom and his colleagues is that comparison of the problem solving methods among students can highly help them benefit from each other. This situation is closely linked to the importance of communication and collaboration (collaborative learning) in the teaching/learning process. In the Algerian context, for example, teachers can opt for such a way in improving their students’ problem solving abilities and let the weak students see how their mates manage to solve problems. Accordingly, the idea of social cognitive theory stressing the importance of modeling in the acquisition of knowledge can be applied here.

I-9-2- Assessing Problem Solving in EFL

I-9-2-1- Key Issues in Assessment

Assessment is a powerful instructional tool and as it was previously mentioned it should be based on instructional objectives which are ‘specific’, ‘measurable’, ‘achievable’, ‘reinforceable’, and ‘timely’ (Woollard, 2010, p. 69). If carried out appropriately, it is likely to result in the improvement of students’ achievements. Indeed, Jonassen (2011) estimates that meaningful assessment of learning such as problem solving at all levels of education may

represent the quickest way for students' leaning enhancement. Central to the understanding of the function of assessment in promoting students' progress, however, is the understanding of the nature of formative assessment (e.g., see Cizek, 2010; Brookhart, 2008; OECD, 2005; & Phye, 1997).

Formative assessment is defined by Popham (2008, p. 6) as "a planned process in which assessment-elicited evidence of students' status is used by teachers to adjust their ongoing instructional procedures or by students to adjust their current learning tactics." It is, nevertheless, worth indicating that the information to be gathered from such a type of assessment should be used for the sake of decision making. With regard to problem solving, teachers, on the one hand, can see the extent to which their practices have brought about positive change in their students' abilities to cope with novel issues, and whether they need to keep using the same teaching procedures, to adjust, or to change them. On the other hand, students, through feedback can be informed about their problem-solving strengths and what needs improvement and how. Teachers as well, can use feedback as a source of motivation. Encouragement expressions like '*good job*', '*carry on*', '*that's great*' could serve the purpose. In brief, it can be stated that not only can formative assessment promote students' performance; it also allows teachers to mediate on the effectiveness of their teaching procedures.

If teachers want to get students go forward in problem solving, they need to understand that students are influenced by the nature of assessment, in that they approach learning following the assessment content and principles. Pickford and Brown (2006), for instance, precise: "if we focus the tasks we set them on recall and memorization, that's what they'll do! If, however, we want them take a deep rather than a surface approach to the development of practical skills, we need to design practical assignments intelligently" (p. 1). This means that the notion of 'washback' is at the heart of any assessment system. Similarly,

Jonassen (2011) affirms that crucial to the learning of problem solving is the use of well-designed and adequate forms of assessment. He adds “if we teach students to solve problems but assess only their ability to recall what they have memorized for a test, then students will not invest mental effort in learning to solve problems” (p.354). Consequently, assessing students’ abilities to solve challenging issues will undoubtedly have a positive washback on the students’ achievement in problem solving. Argumentatively, students will be more concentrated on the mastery of the contents and skills that might ensure success to them. This appears to be very rational.

It is not possible to think of an efficient problem solving unless the students are motivated to get actively involved in it. Some suggestions on how such an aim can be reached are made by Santrock (2001) who clarifies that:

Assessments that are challenging but fair should increase students’ enthusiasm for learning. Assessments that are too difficult will lower students’ self-esteem and self-efficacy, as well as raise their anxiety. Assessing students with measures that are too easy will bore them and not motivate them to study hard enough (as cited in Berry, 2008, p. 107).

What Santrock clarifies pinpoints to the teachers’ responsibility to strive to be good assessors by knowing what to assess and how to assess it. In EFL classes, teachers can, for example, develop problem-solving tests that are challenging and fit the students’ abilities, and through which the students are asked to display their communication skills both orally and in writing.

To assess reasoning strategies, Quellmalz (1997) makes a set of recommendations, which are mainly applicable to the assessment of problem solving. According to her, stress should be on the tasks that are beneficial to students, complex, and which should recurrently do. By complex, it is meant that the tasks require students to integrate a range of reasoning skills rather than “discrete” or “isolated skills.” Second, issues that foster students’ divergent

thinking and require various solutions should be valued more than questions that require one single right answer. Another point on which light should be casted is that rather than just dealing with the product, the assessment formats should also emphasize the process of “inquiry”. Students also should be assessed so that to measure their abilities to apply their background knowledge when solving new problems. Moreover, direct assessment tasks that target students’ reasoning abilities should be emphasised. By so doing, information about what needs improvement can be given to students. Finally, teachers ought to help their students become self-regulated, so that their progress when solving reasoning tasks can be monitored by themselves (pp. 109-110).

It is worth indicating that the reasoning strategies developed by Quellmalz have almost the same characteristics as those of performance-based assessment identified by Aschbacher (1991), Herman et al. (1992). The characteristics, indeed, include: ‘constructed response’, ‘higher-order thinking’, ‘authenticity’, ‘integrative’, ‘process and product’, and ‘Depth versus breadth’ (as cited in O’Malley & Valdez Pierce, 1996, p. 5).

The overall aim in mentioning Quellmalz’ recommendations, as well as the characteristics of performance-based assessment is to come to a better understanding of how assessment of reasoning strategies and performance based assessment look. The recommendations and the characteristics, in essence, offer guidelines that can help teachers implement problem solving in classrooms, as well as become more aware of those behaviors that tell them that problem solving is taking place. By way of illustration, instead of asking students to recall information about Internet, teachers could ask their students to discuss the advantages and disadvantages of the Internet and see how the students make use of their reasoning abilities through speaking or writing.

I-9-2-2- Assessment Formats

For a more fruitful assessment of problem solving, assessment literacy with regard to the various types of testing items and their roles is fundamental. The main types include: ‘multiple choice’, ‘true-false’, ‘matching’, ‘short answer’, ‘essay’, and ‘interpretive exercise.’ The first four types which deal with *selected-response formats* are not favorable for assessing complex learning; whereas the last two: “essay” and “interpretive exercise” are (Berry, 2008). The scope of *selected-response formats* is limited and the questions or problems are to be answered by providing one single-right answer (p. 69). The core advantage of such assessment formats essentially lies in their potential to measure a vast amount of declarative knowledge, while the key drawback of the formats is that they merely require students to retrieve what they have already studied (Quellmalz & Hoskyn, 1997, p. 111). Moreover, in commenting the ineffectiveness of traditional assessment, Hamm and Adam (2009) state that “multiple-choice testing, for example, just doesn’t do a good job of capturing the essence of today’s students” (pp. 35-36). This is because such a testing does not prepare students to better cope with the unpredictability and complexity of real-life situations.

Interestingly, about the limitations of close-response items, Frederiksen (1984) clarifies “While recognising the role played by closed response items in standardised tests, the criterion-referenced testing movement also saw that they were not the most efficient way of representing real-world performances in tests” (as cited in Fulcher, 2010, p. 80). Moreover, Madsen (1983) shows that the main advantages and disadvantages of multiple-choice completion. On the one hand, the advantages involve easiness and consistence of scoring and that they provide students with contextual information. On the other, the negative points relate to the difficulty of constructing good sentences and the students can easily cheat.

As regards the types of tasks dealing with problem solving, (Berry, 1998; McMillan, 2007) identify the following reasoning tasks: “decision-making, drawing inferences, creative

thinking, hypothesizing, generalizing and learning strategies including analyzing, drawing inferences, comparing, recombination, grouping, and association”(as cited in Berry, 2008, p. 69). Nevertheless, the issue that needs resolution at this stage is: How can teachers engage their students in performing the reasoning tasks proposed by Berry and McMillan? To the point, two suggestions can be made. The first is to base the teaching learning process on clear, achievable, and meaningful objectives stressing reasoning. The second suggestion concerns the teachers’ task to motivate and encourage students to get engaged in performing the tasks. This can be done individually or collaboratively.

Open-ended formats require students to provide and build answers of diverse lengths stretching from short responses to lengthy essays. The core advantage of such formats is that they involve a set of acceptable and valid answers and interpretations. Using such formats, the students may be asked to explain and reason. To handle the variety of responses that might be generated through open-ended formats, the assessment criteria should be established in advance (Quellmalz & Hoskyn, 1997, p. 111).

In addition to the previously mentioned formats, there are *performance assessment tasks* that ask “students to engage in sustained reasoning in which they construct solutions and explanations.” Using performance assessment tasks the students may be asked to get involved in “written essays, graphic or visual display, oral presentations, or multimedia demonstrations and performances. For handling such type of assessment formats, specific criteria should be established and made known for both teachers and students. “In accord with the movement toward stressing depth of understanding over breadth of coverage, open-ended and performance-based assessments tend to be favored for assessing reasoning strategies” (Quellmalz & Hoskyn, 1997, pp. 111-112).

I-9-2-3- Key Taxonomies for Assessing Problem Solving

Of the taxonomies that can be used in assessing problem solving, there are: Bloom's Taxonomy (1956), Quellmalz' Taxonomy (1987), and Marzano's Taxonomy (2001). A quick glance at them reveals that Bloom's Taxonomy includes six levels developed hierarchically, and which are: 'knowledge', 'comprehension', 'application', 'analysis', 'synthesis', and 'evaluation'. Quellmalz' Taxonomy includes 'recall', 'analysis', 'comparison', 'inference', and 'evaluation.' As to Marzano's Taxonomy, it bears a more specific dimension with four levels: 'retrieval', 'comprehension', 'analysis', and 'knowledge utilization'.

A point worth explaining is the applicability of the aforementioned taxonomies to the assessment of problem solving. First of all, Bloom's Taxonomy is applicable to problem solving because, as it is stated by Moseley et al., (2005), the taxonomy covers the broad categories of knowledge, namely 'productive thinking', 'building understanding', and 'information gathering', as well as 'higher-order thinking' (p. 288). Second, Quellmalz' Taxonomy principally includes levels which need "the application of a thinking or reasoning component to construct a solution to the assessment probe" (Phy, 1997, p. 47). Finally, about the applicability of Marzano's Taxonomy to problem solving, Moseley et al., (2005) mention that "the inclusion of a knowledge utilisation level, dealing with the orchestration of thinking, makes Marzano's taxonomy meaningful in real-life problem-solving contexts in the workplace and elsewhere" (p. 288). In this context, it is of great importance to throw light on the point that "reproductive skills generally map onto Bloom's categories of knowledge, comprehension and application, while productive skills involve analysis, synthesis and evaluation" (Moseley et al., 2005, pp. 254-255).

The question which arises at this level, however, is: How can teachers assess their students' abilities to solve problems by making use of the taxonomies? An answer to this question is twofold. On the one hand, the thinking levels relating to problem solving should

be targeted. On the other hand, teachers need to target those levels by asking questions that include action verbs. For example, Woollard (2010) suggests a list of action verbs relating to each cognitive stage of Bloom's Taxonomy and which can cover, as well, the levels of Quellmalz' Taxonomy and Marzano's Taxonomy. We hence select examples of which are:

- **knowledge:** *arrange, define, duplicate, label, list, find, memorise, name, order, search, remember, recognise, relate, recall, repeat, identify, locate;*
- **comprehension:** *classify, describe, discuss, indicate, locate, recognise, report, restate, review, select, translate, interpret, explain, express, identify;*
- **application:** *apply, choose, demonstrate, dramatise, employ, illustrate, interpret, operate, practise, schedule, sketch, solve, use, write, utilise, exemplify;*
- **analysis:** *analyze, compare, contrast, criticize, differentiate, discriminate, distinguish, examine.*
- **synthesis:** *arrange, assemble, sequence, build, collect, formulate, compose, construct, create,*
- **evaluation:** *appraise, defend, judge, rate, select, support, value, argue, assess, grade, evaluate* (pp. 67-68).

As regards 'inference and interpretation' and 'comparison' as two cognitive skills in Quellmalz's Taxonomy, the following are offered:

- **Inference:** *infer, predict, test, and draw conclusions* (Quellmalz & Hoskyn, 2007, p. 108)
- **Comparison:** *compare, identify similarities and differences, contrast, and explain* (Quellmalz & Hoskyn, 2007, p. 108)

In the context of discussing the taxonomies, stress should be on the language used within practical learning outcomes. Indeed, a list of verbs relating to the assessment of practical tasks can help teachers to efficiently measure their students' abilities when performing. The following list of verbs is developed following an order of complexity:

- *Demonstrate, show, list, outline, describe*
- *Design, create, develop, implement, make, plan, construct, articulate, formulate, solve*
- *Identify, discriminate between, select, sort, choose, prioritise,*
- *Explain, translate, specify, argue, reason, test*
- *Develop, enable, facilitate, manage*
- *Challenge, critique, research, design, analyse*
- *compare, contrast, judge, evaluate* (Pickford & Brown, 2006, p. 10).

I-10- Problem Solving and Constructivism

I-10- 1- A Brief History of Constructivism

According to Mahoney (2005), constructivism goes back to ancient times as in the case of Lao-Tzu in the sixth century B.C.E who stressed knowledge construction through ‘contrasts.’ In addition, constructivism has its roots in the Greek period. For instance, the pre-Socratic philosopher, Heraclitus (c.535–474 BC) was a constructivist (as cited in Pritchard & Woollard, 2010, p. 2). Additionally, it is proposed by Kirk (1986) that distinction between “an ‘inner’ state of beliefs and an ‘outer’ state of facts, accessible to anyone” is made by Heraclitus. This has to do with constructivism in the sense that individuals’ vision and understanding of the world are constructed by themselves (Walsh, 1999, p. 45). The implication of this idea for instruction is that it is not right to consider students as recipients to be fulfilled with information. Rather, the role of teachers is to stimulate students’ learning abilities by creating an interactive learning atmosphere in which the students become active.

I-10- 2- Constructivism Defined

Richards and Schmidt (2001) define constructivism as “a social and educational philosophy” that emphasises: (1) the active construction of knowledge by learners and not the passive reception of it, (2) the role of cognition as “an adaptive process that organizes the learner’s experiential world”, as well as (3) any knowledge construction takes place in a social context (pp. 123-124). Shaped differently, to say that constructivism occurs is to say that individuals play an active role in generating their own understandings of the world drawing on their creative faculties and experience. In EFL contexts, students are intended to take on tasks and responsibilities at which they are psychologically motivated and socially involved. In explaining the essential features of constructivism, Brooks and Brooks (1999) clarify that constructivist teaching emphasises concepts’ understanding by students by offering students chances to enhance such understandings “by posing contradictions, presenting new

information, asking questions, encouraging research, and/or engaging students in inquiries designed to challenge current concepts” (p. ix).

The definition of constructivist learning theory helps understand the way humans build knowledge. In this sphere, Pritchard and Woollard (2010) write: “This theory is based on the central notion that as learners we construct our own understanding of the world around us based on experience as we live and grow” (p. 8). That is, knowledge is a matter of construction that takes place by joining background knowledge with new one. The following highlights the differences between traditional and constructivist classrooms:

Table 1

A Look at School Environments (Brooks & Brooks, 1999, p. 17)

Traditional Classrooms	Constructivist Classrooms
Curriculum is presented part to whole, with emphasis on basic skills.	Curriculum is presented whole to part with emphasis on big concepts.
Strict adherence to fixed curriculum is highly valued.	Pursuit of student questions is highly valued.
<i>Curricular activities rely heavily on textbooks and workbooks.</i>	<i>Curricular activities rely heavily on primary sources of data and manipulative materials.</i>
<i>Students are viewed as “blank slates” onto which information is etched by the teacher.</i>	<i>Students are viewed as thinkers with emerging theories about the world.</i>
<i>Teachers generally behave in a didactic manner, disseminating information to students.</i>	<i>Teachers generally behave in an interactive manner, mediating the environment for students.</i>
<i>Teachers seek the correct answer to validate student learning.</i>	<i>Teachers generally behave in an interactive manner, mediating the environment for students.</i>
<i>Teachers seek the correct answer to validate student learning.</i>	<i>Teachers seek the students’ points of view in order to understand students’ present conceptions for use in subsequent lessons.</i>
<i>Assessment of student learning is viewed as separate from teaching and occurs almost entirely through testing.</i>	<i>Assessment of student learning is interwoven with teaching and occurs through teacher observations of students at work and through student exhibitions and portfolios.</i>
<i>Students primarily work alone.</i>	<i>Students primarily work in groups.</i>

In the following paragraphs stress is on Vygotsky's and Piaget's constructivist learning theories and their implications for teaching problem solving.

I-10-3- Vygotsky's Social Learning

Interaction among humans is considered by Vygotsky (1978) as a basic element that contributes to the development of individuals' mental skills writing that "all the higher functions originate as actual relations between human individuals" (p. 57). In addition, Vygotsky explains that:

Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (*interpsychological*) and then inside the child (*intrapsychological*). This applies equally to voluntary attention, to logical memory, and to the formation of concepts (Vygotsky, 1978, p. 57).

From this point of view, personal characteristics and traits, as well as the social context should be taken into account in instruction. In other words, individuals develop on the basis of what they possess as personal and on what they acquire as social. In this respect, Daniels (2001) notes "Vygotsky was suggesting a process of social formation in the development of educational ideas [...] For him pedagogies arise and are shaped in particular social circumstances" (p.6).

A key component of Vygotsky's constructivist theory is the Zone of Proximal Development or simply ZPD defined as "the distance between the actual development level as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). In plain terms, the Zone of Proximal Development is the added value between what someone can do alone and what he/she can do when supported by others who are more knowledgeable and competent. In brief, the basic meaning of ZPD is social interaction and collaboration. Therefore, it becomes a crucial concern of EFL teachers to support and show their students the best ways leading to creative solutions.

The implications of Vygotsky's constructivist theory for problem solving are various. To begin with, the theory, by stressing social context and interaction, provides conditions under which collaborative and individual problem solving can be promoted. Interaction among students to undertake cognitive activities creatively helps develop their intrapersonal and interpersonal skills. Students will appear communicatively involved in handling issues that mirror creative reasoning.

Second, the explanation of the ZPD provided previously shows that teachers can support their students with valuable hints to solve problems that represent difficulties when approaching them individually. This means that students' practices should be observed and guided by teachers so that students come to create solutions in reference to what has been established in terms of standards and criteria. The standards by which students' problem solving is judged cannot be unknown to the students. In the case of ZPD, teachers explain the importance of generating solutions following principles, as well as the necessity of judging the value of the solutions against standards and criteria. The applicability of ZPD in problem solving has been indicated by Galperin (1969) writing that the "teaching/learning experiment," also theoretically rooted in the concept of ZPD, was perfected in Russia as a measure of the level of internalization of problem solving cognitive strategies" (as cited in Kozulin, 2002, p. 106).

Teachers' guidance is not by itself a guarantee for success in problem solving, but in all situations it has the value of motivation and orientation that would maximize the degree of success and reduce the threat of demotivation and deconcentration. In the context of teacher's help and problem solving, Vygotsky (1987) writes: "When the school child solves a problem at home on the basis of a model that he has been shown in class, he continues to act in collaboration, though at the moment the teacher is not standing near him" (p. 216). What is being highlighted in the quotation is the positive impact that teacher's help and guidance

might have on students' abilities to solve problems and this is explicitly confined to the Zone of Proximal Development as a tool to be used in promoting students' problem-solving abilities.

In relation to what has been explained previously about ZPD, Brooks and Brooks (1999) note that "constructivist teachers often offer academic problems that challenge students to grapple first with the big ideas and to discern for themselves, with mediation from the teacher, the parts that require more investigation" (p. ix). This fundamentally implies the importance of the teacher's guidance in the teaching/learning process.

I-10-4- Piaget's Constructivist Theory

One of the most known figures in constructivism is Piaget. Piaget's theory is constructivist, and it is based on the following principles:

- *Understand cognitive development.*
- *Keep students active.*
- *Create incongruity*
- *Provide social interaction* (Shunk, 2012, p. 239).

The first element "understand cognitive development" indicates that students' learning capacities should be taken into account by teaching them according to their cognitive abilities. For instance, we cannot teach first-year students and master two students at university the same way. The second element "keep students active" relates to the positive role that students need to play in the learning process. They should not be considered as receivers of information, rather constructors of knowledge. As regards the third element "create congruity", Schunk (2012) states that it "can be created by allowing students to solve problems and arrive at wrong answers" (p. 240). Finally, the last element "provide social interaction" relates to the important role that interaction plays in knowledge construction. Said differently, people need each other to construct their understanding of reality.

From what has been said, it becomes clear that Piaget's theory has implications for problem solving. First of all, problem solving takes place in relation to use of mind in creating

solutions. Second, problem solving engages learners in interaction to construct solutions. Third, problem solving is mainly based on producing rather than receiving.

Piaget's constructivist theory has deep implications for teaching and assessing problem solving in EFL contexts. EFL Teachers can make use of the principles of the theory to stress the students' assimilation capacities when exposing them to problem solving. The students' cognitive abilities should be taken into account when teaching and assessing problem solving. This would have a positive impact on students' motivation to actively handle problem solving issues. Additionally, EFL teachers could stress the principles of assimilation, adaptation, and equilibration as main parts of the problem solving process that the students need to go through. Teachers' guidance at this stage is foundational in that it is meant to enlighten the students' about the relevant ways leading to the equilibration stage. The latter can be viewed in terms of goal attainment and the final state of the problem resolution journey. Accordingly, students' exposure to incongruity is of paramount importance. This would challenge the students' creative skills to solve complex problems.

I-11- The Approach: Bloom's Taxonomy, Quellmalz's Taxonomy, Marzano's Taxonomy, Cognitive Flexibility Theory, The 3C3R Model, and Polya's Problem Solving Model

In order to base our study on scientific criteria and to have evidence to explain the various points relative to the issue under study, we opt for Bloom's Taxonomy, Quellmalz's Taxonomy, Marzano's Taxonomy, Cognitive Flexibility Theory, and The 3C3R Model as they include the cognitive stages involving problem solving. Accordingly, a detailed account of the taxonomies should be provided.

I-11- 1- Bloom's Taxonomy

Independently from being dated, Bloom's taxonomy is still applicable in the field of research, peculiarly in testing and evaluation. This is mainly due to the fact that the taxonomy

incorporates the most valuable cognitive stages involved in learning, namely: analysis, synthesis and evaluation. These stages reflect advanced levels of thinking, reflection and reasoning. Therefore, the use of Bloom's taxonomy in our research can be amply justified for its inclusion of the thinking skills that are the cornerstone of the twenty-first century education. In this context, Phye (1997) writes: "One of the strengths of Bloom's taxonomy is that it lends itself to the development of instructional objectives as well as assessment targets" (p. 46). In the light of this, Bloom's taxonomy can be viewed as a worthy bedrock on which teachers can base their teaching and assessment practices.

The main stages of the taxonomy relating to the cognitive domain are: 'knowledge', 'comprehension', 'application', 'analysis', 'synthesis', and 'evaluation' that are organized hierarchically. First of all, knowledge involves recalling things, information, events, etc. For example, one can remember the date of an event, the name of a person or a place. As to 'comprehension', Bloom views it as dealing with the understanding of what is being communicated either orally, symbolically, or in writing. Included in this level are 'translation', 'interpretation' and 'extrapolation'. 'Application' relates to knowledge utilization in novel situations to reach an objective as, for instance, solving a problem. The main feature of application is that knowledge should be used in new situations. Analysis involves dividing a material into its constituents and considering the way the constituents are linked to each other. Synthesis involves arranging things in a way to form "a whole". As regards the last stage evaluation, it relates to determining and assessing the value of works, materials, and methods following a set of norms and standards (Bloom, 1958, pp. 62-144).

Having dealt with the explanation of the levels of Bloom's taxonomy, it is important to indicate that "reproductive skills generally map onto Bloom's categories of knowledge, comprehension and application, while productive skills involve analysis, synthesis and evaluation" (Moseley et al., 2005, pp. 254-255). What is being mentioned here is that the

levels which deal with problem solving in Bloom's taxonomy are: 'analysis', 'synthesis' and 'evaluation'. Justifiably, problem solving covers the analysis of information in terms of relevance, the combination of the information to create alternatives, and at the end the evaluation of the alternatives. In this regard, it is to be clarified that Bloom's Taxonomy is applicable to problem solving because, as it is stated by Moseley et al., (2005), the taxonomy covers the broad categories of knowledge, namely 'productive thinking', 'building understanding', as well as 'higher-order thinking' (p. 288).

I-11-2- Quellmalz's Taxonomy

Quellmalz (1987) developed a five-component-taxonomy. The components include: 'recall', 'analysis', 'comparison', 'inference and interpretation', and 'evaluation'. At this level, there is no need to repeat the explanation of the stages which are also included in Bloom's taxonomy, that is, recall, analysis, and evaluation. For example, in dealing with Bloom's taxonomy and Quellmalz's taxonomy Phye (1997) points out that "the terms recall and knowledge are used synonymously" (p. 47). Thus, our focus here is on the two remaining stages, namely 'comparison' and 'inference and interpretation'. The former (comparison) "involves identifying similarities and differences and understanding their overall significance" and the latter (inference and interpretation) is about using "various forms of inductive and deductive reasoning, including applications of rules or heuristics to reach a conclusion or solve a problem" (Quellmalz, 1997, p. 106). The terms deduction and induction have been defined by Richards and Rodgers (2005) stating that deductive reasoning goes from general to specific facts, whereas inductive reasoning goes from specific to general facts.

Searching on problem solving requires a well-defined and integrated framework. As a result, like Bloom's taxonomy, Quellmalz' framework is also applicable in the field of problem solving as it includes levels which need "the application of a thinking or reasoning component to construct a solution to the assessment probe" (Phye, 1997, p. 47). To indicate

the different stages that are involved in problem solving, Quellmalz (1987) made reference to different authors Bransford and Stein (1984); Chi, Glaser, and Rees, (1982); Newell and Simon (1976) by stating that “in a different vein, psychological research on problem solving has revealed that the psychological processes of analysis, comparison, induction, and deduction are involved in problem solving” (p. 88). The advantage of this integrated approach is that it incorporates the main cognitive levels relating to problem solving, and when implemented the approach helps classify language items and activities into those involving problem solving and those that do not. The approach, in brief, is practical and it can be used to explore issues about teaching materials, teachers’ practices, and students’ learning.

To obtain the results, this study adopts the checklist method. In its most literal sense, a checklist consists of a list of items which is “referred to for comparison, identification or verification” (Collins English Dictionary, 1992, cited in McGrath, 2016, p. 32). The checklist is set to verify the inclusion of problem solving in the material under evaluation. The results of the checklist are presented in the appendix.

I-11- 3- Marzano’s New Taxonomy of Educational Objectives

Marzano’s New Taxonomy includes six levels and they are illustrated in the following:

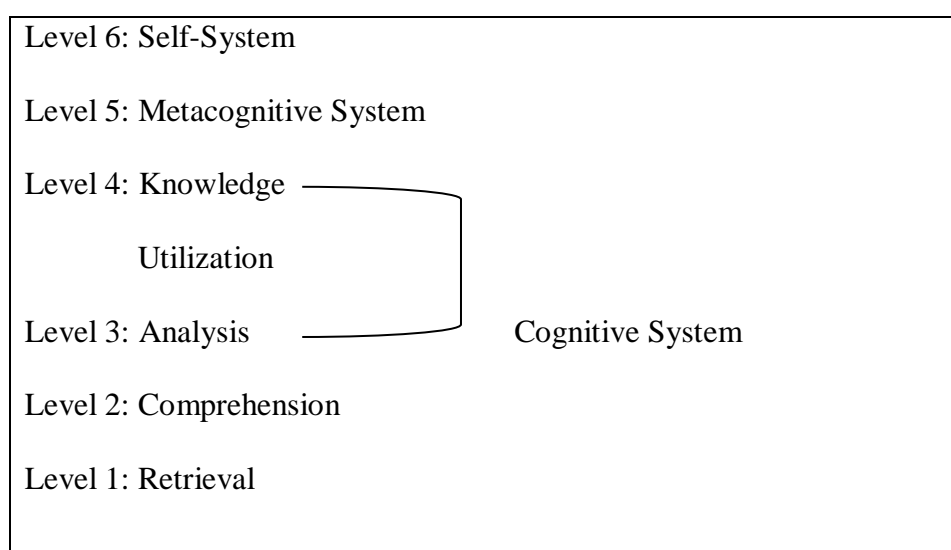


Figure 1. Six Levels of the New Taxonomy (Marzano, 2001, p.30)

Level 1 of Marzano's taxonomy is called 'retrieval' or 'recall'. It is the cognitive skill that is concerned with the activation and transferring of knowledge stored in permanent memory to working memory like, for instance, recalling the name of an author. Retrieval is related to inference. **Level 2** 'comprehension' is the cognitive level responsible for knowledge translation into a form so that it can be appropriately sorted in permanent memory. In the New Taxonomy 'comprehension' incorporates 'synthesis' and 'representation' as two interrelated processes (Marzano, 2001, pp.30-34). On the one hand, 'synthesis' is defined as "the process of distilling knowledge down to its key characteristics, organized in a parsimonious form—technically referred to as a macrostructure" (Kintch, 1974, 1979; van Dijk, 1977, 1980, as cited in Marzano, 2001, p. 34). On the other hand, 'representation' relates to "creating symbolic analog of the knowledge contained in the macrostructure", and representing knowledge in "some symbolic, imagery (i.e., nonlinguistic) mode" (Marzano, 2001, p. 35).

Level 3 'analysis' is associated to "the reasoned extension of knowledge" relying on what has been understood. In the New Taxonomy, analysis addresses the production of novel information. The processes involved in analysis are: "(1) matching, (2) classification, (3) error analysis, (4) generalization, and (5) specification" (Marzano, 2001, p. 38). First, 'matching' involves "the identification of similarities and differences" between knowledge parts. Matching is either simple or complex. It is simple when the similarities between two things are easily noticeable and complex when this can be done with difficulty. In the New Taxonomy matching refers to the latter (Mandler, 1983 as cited in Marzano, 2001, p. 39). Second, 'classification' takes place when knowledge is put into meaningful categories. Classification can be very challenging when employed as an analytic process. Third, 'error analysis' deals with "the logic or reasonableness of knowledge." When it comes to consider error analysis as an analytic tool, this process addresses "(a) consciously judging the validity of the knowledge based on explicit criteria and (b) identifying any errors in reasoning that

have been presented”. Fourth, ‘generalizing’ refers to the process of building novel generalizations from previously known information. Involved in this process, there is inference. Such inferences are more about induction than deduction. Fifth, ‘specifying’ revolves around the generation of “new applications of a known generalization or principle.” When compared as analytic tools “generalizing is more inductive” and specifying appears to be “more deductive in nature” (Marzano, 2001, pp. 39-45).

Level 4 of the taxonomy is ‘knowledge utilization’. The processes involved in the level are used to do particular tasks, and they include four broad categories: (1) decision making, (2) problem solving, (3) experimental inquiry, and (4) investigation (Marzano, 2001, pp. 45). On the one hand, decision making is a cognitive process that indicates “when an individual must select between two or more alternatives” (Baron, 1982, 1985; Halpern, 1984, as cited in Marzano, 2001, p. 45). On the other hand, problem solving addresses the process that one follows when trying to attain a goal “for which an obstacle exists” (Rowe, 1985, as cited in Marzano, 2001, pp. 46-47). The widely followed steps and heuristics in solving problems involve:

- Identification of obstacle to goal
- Possible re-analysis of goal
- Identification of alternatives
- Evaluation of alternatives
- Selection and execution of alternatives (Halpern, 1984; Rowe, 1985; Sternberg, 1987, as cited in Marzano, 2001, pp. 46-47)

For the sake of clarity, the present study adopts only ‘decision making’ and ‘problem solving’ from the New Taxonomy. The other stages (‘experimental’ enquiry and ‘investigation’) are not involved in the study as they go beyond its scope and objectives.

I-11- 4- The Rationale for Adopting Blooms' Taxonomy, Quellmalz's Taxonomy, and Marzano's Taxonomy in the Present Study

The main reasons for using the three taxonomies in the current study are based on (Moseley et al, 2005), and they are as follows:

1/ The three taxonomies encourage higher-cognitive skills that might benefit the students inside and outside school contexts

2/ There is much that can be done by EFL teaching materials designers and EFL teachers adopting the three taxonomies to improve teaching and assessment practices.

3/ The three taxonomies help build assessments appropriate for the 21st century.

4/ Problem-solving tasks can be developed stressing the higher levels of the taxonomies.

5/ High quality educational assessments to support the lower-achieving, the average achieving, and the higher-achieving students can be designed using the taxonomies

6/ The taxonomies cater for both 'declarative' and 'procedural' knowledge.

7/ The implementation of the levels of the taxonomies can be done through the means of verbal and written communication.

8/ Individual and group problem solving can be organised using the taxonomies

9/ The taxonomies represent instructional richness as strong motivating vectors for students.

I-11- 5- Cognitive Flexibility Theory: The Core Components

Cognitive Flexibility Theory was advocated by Spiro et al. (1988). The theory stresses advanced knowledge construction rather than mere knowledge reproduction in that it adopts a constructivist approach entailing that learners should build knowledge actively. The theory, as its name indicates, emphasizes switch in thought for the sake of avoiding cognitive rigidity. The theory, hence, can be viewed as encouraging critical thinking and intellectual freedom.

Cognitive flexibility theory is a learning theory that is based on the principles of cognitivism. It posits that there exist types of knowledge that are featured with complexity

and ill-structuredness. One of the advantages of cognitive flexibility theory is that it is based on the principles of cognitivism (Sato, 2010, p. 592).

Spiro et al. (1988) explain advanced knowledge acquisition highlighting “The learner must attain a deeper understanding of content material, reason with it and apply it flexibly in diverse contexts” (p.4). Additionally, the meaning of advanced level in the present study is clarified by making reference to Osterlind (2009) who explains that Bloom et al. (1956) developed a six-level Taxonomy of Educational Objectives in a form of a hierarchy: knowledge, comprehension, , application, analysis, synthesis, and evaluation. The levels run from the basic ones including the first two to the most advanced incorporating: application, analysis, synthesis, and evaluation. Shaped differently, advanced level covers the four cognitive skills: application, analysis, synthesis, and evaluation.

Spiro et al. (1988) annotate that “Cognitive flexibility involves the selective use of knowledge to adaptively fit the needs of understanding and decision making in a particular situation; the potential for maximally adaptive knowledge assembly depends on having available as full a representation of complexity to draw upon as possible” (p. 6). Explained in a different way, cognitive flexibility entails complexity of problem situations that incite to knowledge assembly stressing adaptiveness and effective decision making. From the point of view of practice, the question arises as to how it is possible to report the occurrence of cognitive flexibility. The answer, referring to what has already been reviewed, is when solutions to ill-structured and complex problems are generated flexibly stressing the higher-cognitive levels such as analysis, synthesis, and evaluation.

I- 11-5-1- Avoidance of Oversimplification and Overregularizations

It is important to emphasise that acquiring advanced knowledge cannot take place straightforwardly and in a mere way. At this stage, ‘simplicity’ and ‘regularity’ should be replaced by ‘complexities’ and ‘irregularities’ that are inherent parts of advanced knowledge

acquisition. To avoid oversimplification and overregularization, cognitive flexibility theory stresses ‘component interactions’, ‘conceptual combination’ ‘selective use of knowledge’ and ‘knowledge assembly’ (Spiro et al. 1988, pp.4-5). The idea is that effective knowledge assimilation fundamentally rests on understanding the differences and affinities that exist among the various parts of knowledge, and then knowing how to combine those knowledge components that are joinable and interrelated. Such a principle in cognitive flexibility theory involves understanding, knowledge analysis, and synthesis. The first is a lower level in Bloom’s taxonomy and the last two belong to its higher-cognitive skills.

I-11- 5-2-Multiple Representations

Cognitive flexibility theory rejects one-way knowledge representation. Indeed, the theory advocates the necessity of displaying knowledge in a wide range of manners. The ill-structuredness and complexity of domains and cases entail a multi-facet knowledge representation. In brief, “Knowledge that will have to be used in many ways has to be learned, represented, and tried out (in application) in many ways” (Spiro et al., 1988, p. 5). In such a way, cognitive flexibility theory could be said to emphasize students’ multiple intelligences and their diverse learning styles, as well as the efficient use of multimedia.

I-11- 5-3-Centrality of Cases

Effective reasoning that stems from already experienced instances is a key to handle the high variability and multidimensionality of cases in ill-structured domains. That is, knowledge application to such cases should build on the irregularities that exist among the cases rather than on general principles. This is due to the fact that “in ill-structured domains, there is great variability from case to case regarding which conceptual elements will be relevant and in what pattern of combination” (Spiro et al 1988, p. 7). That is, each problem situation has its particularities that determine the knowledge combinations to undertake.

I-11- 5-4-Conceptual Knowledge as Knowledge-in-Use

There is a clear-cut distinction between the abstract meaning of a concept and its practical use in an ill-structured domain. This is because “in an ill-structured domain there will be greatly increased variability across cases in the way the same concept is used or applied” (Spiro et al., 1988, p. 7). At the heart of the component is the significance of the conceptual information that determine the true and right meaning of a given concept in complex and ill-structured problem situation.

I-11- 5-5-Schema Assembly (from Rigidity to Flexibility)

In the domains that are complex and ill-structured there should be a shift from the use of ‘rigid’ structures of knowledge to ‘flexible’ ones. The idea is that it is not possible to possess a ‘prepackaged schema’ for all cases (Spiro et al., 1988, p. 8). Subsequently, cognitive flexibility theory requires for the acquisition of knowledge “storage of fixed knowledge is devalued in favor of the *mobilization of potential knowledge*” (Spiro, et al., 1987; see also Schank, 1982 as cited in Spiro et al., 1988, p. 8). The importance of the component is that it openly invites instructors and program designers to flexibly involve learners in new knowledge construction.

I-11-5-6-Noncompartmentalization of Concepts and Cases (Multiple Interconnectedness)

In ill-structured domains, it is not acceptable to view concepts as disparate ‘chapters’. Instead, concepts are to be treated as interconnected entities. Accordingly, “rather than relegating concepts or cases to separate compartments, chapters, and so on, our systems strive for *multiple interconnectedness (of cases and concepts along multiple conceptual and clinical dimensions)*” (Spiro et al., 1988, p. 8). The component draws attention to knowledge use in a synthetical way rather than in isolated manners. This, as a result, requires to put stress on integrative approaches of assessment.

I-11-5-7-Active Participation, Tutorial Guidance, and Adjunct Support for Management of Complexity

Supporting students to construct and acquire knowledge effectively in ill-structured domains should be stressed by all teachers (Spiro et al., 1988, p. 10). The application of the component is restricted to teaching and learning situations in which teachers' support and guidance their students are crucial. In the following, a summary of the theory is provide:

Table 2

Cognitive Flexibility Theory: A Summary of the Main Components

1. Avoidance of Oversimplification and Overregularizations	<ul style="list-style-type: none"> ● Ill-structuredness, complexities, and irregularities should stressed ● Atomistic decomposition of knowledge should be avoided ● Interact patterns of conceptual combination should be demonstrated ● Selective use of knowledge to adaptively fit understanding and decision making ● Knowledge assembly depends on complexity
2. Multiple Representations	<ul style="list-style-type: none"> ● Single representations of knowledge should be avoided ● Varied ways of thinking about a conceptual topic. ● One way of modeling knowledge should be avoided ● The students should not be viewed as machines.
3. Centrality of Cases.	<ul style="list-style-type: none"> ● General principles cannot be applied to all cases as each case has its peculiarities. ● There is great 'variability' from case to case regarding conceptual elements selection and combination.
4. Conceptual Knowledge as Knowledge-in-Use.	<ul style="list-style-type: none"> ● The role of abstract knowledge in ill-structured domains is highly intertwined with that of case-centered reasoning. ● Recognition of increased variability across cases in the way the same concept is used or applied.
5. Schema Assembly (from Rigidity to Flexibility).	<ul style="list-style-type: none"> ● There should be a shift from the use of 'rigid' structures of knowledge to 'flexible' ones ● There must be a shift from "retrieval of intact, rigid, knowledge structures", to knowledge assembly.
6. Noncompartmentalization of Concepts and Cases (Multiple Interconnectedness).	<ul style="list-style-type: none"> ● Concepts are to be taken as interconnected entities and not as disparate 'chapters' .
7- Active Participation, Tutorial Guidance, and Adjunct Support for Management of Complexity.	<ul style="list-style-type: none"> ● Effective knowledge construction by students must be guided by teachers or tutors.

I-11-5-8- The Rationale for the Use of CFT in the Present Study

Of the components of Cognitive Flexibility Theory discussed so far, four are being used in the present study regarding the evaluation of the EFL BAC exams (second subject) in terms of complex problem solving. Indeed, the components are: ‘avoidance of oversimplification and overregularizations’, ‘multiple representations’, ‘schema assembly’, and ‘multiple interconnectedness’. The adaptation of the other components including: ‘Centrality of Cases’ and ‘active Participation, Tutorial Guidance, and Adjunct Support for Management of Complexity’ goes beyond the scope of the present study.

The basic reasons for the adaptation of CFT in the evaluation of the EFL BAC examinations in terms of problem solving relate mainly to the fact that the theory takes into account both the principles of cognitivism and constructivism. In addition, the theory stresses the importance of higher-order thinking skills in solving ill-structured and complex problems. Through the use of the theory teachers can assign their students tasks that encourage cognitive flexibility and effective assembly of knowledge in terms of principled synthesis. The idea is that the theory fights against cognitive rigidity in following a fixed model and in adopting unique and single representations of knowledge. This explanation allows to state that the theory invites to critical reasoning and critical thinking by giving students the chance to go beyond routine reproduction of knowledge to critical and flexible knowledge construction through the resolution of new complex problems.

I-11-6- The 3C3R Model

The 3C3R model encompasses two sets of components. One set refers to ‘core components’ including: ‘content’, ‘context’, and ‘connection’. The other set deals with ‘processing components’ incorporating: ‘researching’, ‘reasoning’, and ‘reflecting’ (Hung, 2006, p. 55). Additionally, Hung (2006) clarifies that “The 3C3R PBL problem design model

is a systematic method specifically designed to guide instructional designers and educators to design effective PBL problems for all levels of learners” (p. 56).

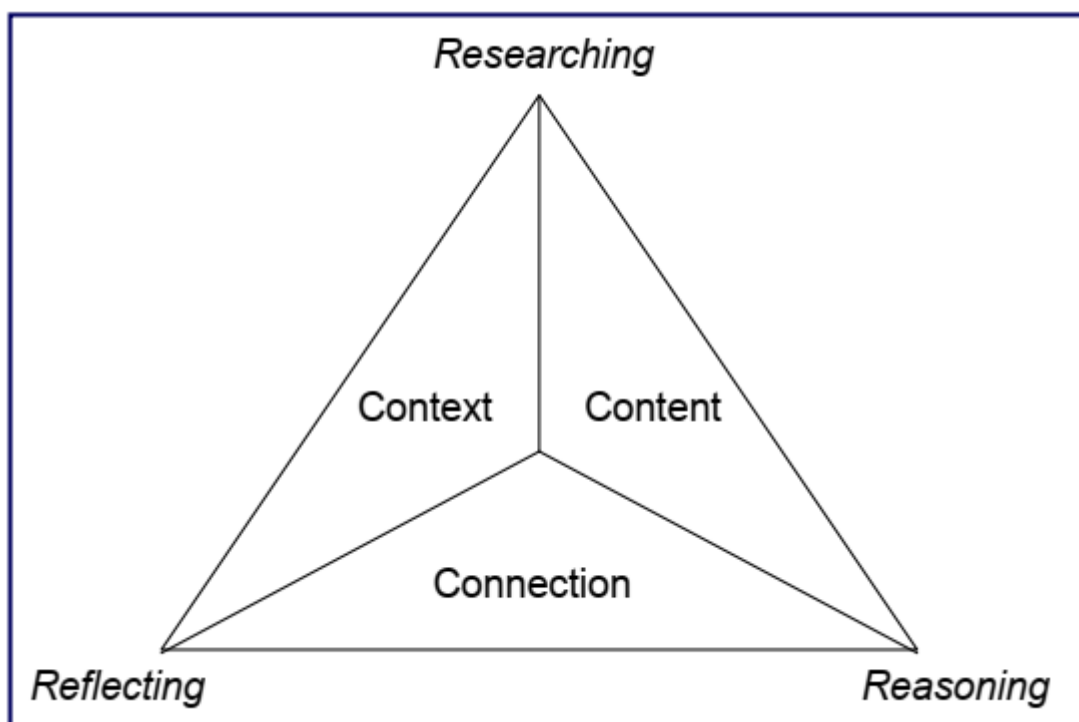


Figure 2. 3C3R PBL Problem Design Model (Adopted from Hung, 2006, p. 57)

The model core components: ‘content’, ‘context’, and ‘connection’ are essentially set to know whether content knowledge is appropriate and sufficient, and whether knowledge is contextualized and integrated (Hung, 2006, p. 57). Likewise, the main role of the processing components of the model is to smooth the way for an effective involvement of the students in problem-based learning. The processing components, namely ‘researching’, ‘reasoning’, and, ‘reflecting’, are ‘the dynamic elements’, as compared with ‘the static core components’ of the model. The overall aim of the three components is to support a worthwhile and significant involvement of the students “in scientific inquiry and problem-solving processes and to cultivate effective and efficient learners and problem solvers” (Hung, 2006, p. 63).

I-11-6-1- Content

In problem-based learning content knowledge is very important as Malopinsky et al. (2000) contend that PBL is developed to support students enhance their skills in problem-solving at the same time they are building their domain knowledge. Because domain knowledge is the foundation of reasoning and solutions generation, in PBL the crucial value of the two is the same (as cited in Hung, 2006, p. 58).

A set of crucial aspects about content should be stressed to effectively design problem-based learning problems. The first aspect is *aligning with curricular standards*. At this stage, instructional designers and teachers are called on to align problem-based learning problems with curricular standards relative to the main concepts and topics. The second aspect relates to **Scope of problems** and this involves ‘breadth’ and ‘depth’ of the problem scope. The breadth of the problem scope can be attained by considering the students’ needs and the to be learned skills and contents to reach the instructional objectives (Hung, 2006, p. 58).

PBL problems are to be designed with relevant depth by stressing two criteria ‘complexity’ and ‘ill-structuredness’ (Koschmann et al., 1994; Weiss, 2003; as cited Hung, 2006, p. 59). If the learners are assigned problems that can be solved by making reference to recall of data, the learners are likely to be demotivated and prevented from reaching deep understanding (Hung, 2006, p. 59).

I-11-6-2- Context

Context is crucial in learning and it is the second basic component in the 3C3R model. In this regard, it is suggested by cognitivists such as Godden and Baddeley (1975) that retention of knowledge and skills will be much more easier when the learning of content takes place in a context that is identical to that in which it will be used (as cited in Hung, 2006, p. 59). In addition, Torp and Sage (1998) propose that information about the context in which

the problem occurs supports learners to relate the knowledge they build and the skills they acquire to similar real-world situations (as cited in Hung, 2006, p. 59).

Three foundational elements are to be stressed when dealing with the context component: ‘contextual validity’, ‘degree of contextualization’, and ‘students’ motivation’ (Hung, 2006, p. 60). Firstly, *contextual validity* indicates that problems in problem-based learning should be context-dependent (Hays & Gupta, 2003 as cited in Hung, 2006, p. 60). Secondly, *degree of contextualization* should be appropriate in the sense that ‘over-contextualized’ problems may make the students feel submerged in needless and irrelevant data, and under-contextualized’ problems impede deep understanding because they do not cover basic and crucial learning items (Hung, 2006, p. 60). The third element is *motivation issues*. It is argued by Biggs (1989) that intrinsic motivation relative to ‘curiosity’ or ‘interest’ to what to be studied or “when an immediate threat was posed” fosters students’ understanding. In addition, Barrows (1994) contends that the authenticity of context should be stressed as it is crucial for students’ motivation (as cited in Hung, 2006, p. 60).

I-11-6-3- Connection

For an effective resolution of ill-structured problems, students must not only have a good background in terms of basic and foundational knowledge (Battig, 1979; cited in Hung, 2006, p. 61), they, too, are required to relate their background knowledge into “an effective knowledgebase network and be able to cross-reference related concepts” (Jacobson & Spiro, 1994; Spiro et al., 1988; as cited in Hung, 2006, p. 61). In addition, students can be guided by the component into a clear comprehension of the idea that differences of contexts may bring about differences in the meaning of the same concepts and variables (Hung, 2006, p. 61).

I-11-6-4-Researching

Students can start solving problem effectively by understanding the problem (Bransford & Stein, 1984; Polya, 1957). This is termed ‘problem space construction’ (Newell

& Simon, 1972; as cited in Hung, 2006, p. 63). The researching component means that students are mainly required to look for the necessary and relevant information to solve the problem by stressing two elements: 'goal specification' and 'context specification'. The first element allows students to look for relevant information relative to the problem, while the second indicates that specific application of the domain knowledge in which the problem occurs should be taken into account (Hung, 2006, pp. 63-64).

I-11-6-5-Reasoning

Reasoning includes analysis of the data relative to the to-be solved problems, as well as to the testing of hypotheses and possible solutions. Both the researching and reasoning components are interrelated and crucial in problem-based learning as they allow students to get involved in effective problem solving. In this vein, it is to be mentioned that it is the higher-order thinking skills that are required for researching and reasoning. However, it is fundamental to set a balance between the stages of researching and reasoning needed for problem solving and the learners' cognitive readiness stages and their abilities in self-directed learning (Hung, 2006, p. 64). It means researching and reasoning should be aligned with students' motivation and thinking skills.

I-11-6-6-Reflecting

Students' problem solving skills can be improved when the students reflect on and assess their problem-solving strategies, as well as when they examine the hypotheses and solutions that they possibly overlooked during their problem-solving process (Andre, 1986; Duell, 1986; cited in Hung, 2006, p. 66). In this regard, Hung (2006) contends: "Incorporating a reflection component into PBL problems can promote learner independence and metacognitive skills and, ideally, cultivate their habits of mind to reflect on their own learning" (p. 66). The author stresses that following this way, learners become able to enhance their learning achievements, as well as their self-directed learning.

In dealing with the reflective component, students can go through two kinds of reflective processes: 'formative and 'summative'. In the former reflection relates to the process, while in the latter it deals with the product (Hung, 2006, pp. 66-67).

Having considered the relevant literature on problem solving in terms of definition, importance, methods of problem solving, as well as teaching and assessment of problem solving in section one of the first chapter, and so on the coming section is concerned with the review of literature on EFL teaching materials evaluation.

I-11-6-7- Rational for the Use of Hung's 3C3R PBL Model in the Current Study

The following are the basic reasons behind the use of Hung's 3C3R problem-based learning model for the evaluation of the English program designed by the Algerian Ministry of Education for BAC classes:

- 1- The Model includes the basic concepts to be used in problem understanding and analysis including content', 'context', 'connection', 'researching, 'reasoning', and 'reflecting.'
- 2- The model can be used at all levels of instruction.
- 3- The last three stages of the model are related to main tenets of deep thinking and reasoning. Accordingly, using the model may allow to figure out the hidden aspects of teaching materials in terms of positive and negative sides.
- 4- The model encourages thorough analysis as careful consideration of its components requires time and strategic knowledge.

I-11-7- Polya's Problem Solving Model

To carry out the experimentation, Polya's problem solving model has been used. The model has already been explained and presented in the previous parts of the study. The basic motives for the use of Polya's model for carrying out the experimentation are as follows:

- 1- The model is not difficult to understand and it can be applied straightforwardly.

2- The model has as its first phase ‘problem understanding’ that shows the importance of getting the meaning of problem solving issues before getting involved in their resolution. This allows the students to get focused and avoid being out of topic.

3- The second phase of the problem standing for ‘devise a plan’ points towards the value and importance of solving problems strategically and in an organised way. This may provide the students with opportunities to follow a logical flow in their problem solving process.

4- The model’s third step ‘carry out the plan’ turns around the relevant actions to be taken by the students to put into practice their understanding and strategic knowledge. This should be done in accordance with the ‘relevance’ and ‘coherence’ criteria.

5- The model’s last phase ‘look back’ pinpoints into the importance of self-assessment and self-monitoring regarding the whole problem solving process. By so doing, the students are likely to avoid incoherence and ambiguities in their problem solving journey.

Conclusion

The present chapter has highlighted the various definitions of the notions of problem and problem solving, the categorization of problems, the importance of problem solving, and the necessity to integrate it into instruction. Discussed in the chapter are the two approaches used in problem solving, namely the behaviourist and the cognitive approach. In addition, it has been argued that problem solving basically deals with the solution of new, challenging, and complex problems, and that instruction is meant to focus on the teaching of those cognitive skills that enable learners to creatively approach problems. Another important point has been examined in the review is that problem solving can be efficiently taught by choosing good problem solving methods and designing relevant problem solving tasks and that the learners’ problem solving methods need to be changed when they are inefficient. Moreover, research has demonstrated that previous knowledge plays an important role in problem solving which has much to do with other related concepts such as reasoning, cognition,

critical thinking, creative thinking, decision making, induction, deduction, metacognition, and so on.

Chapter Two: EFL Teaching Materials Evaluation: A Literature Review

Introduction

The evaluation of language teaching materials has been the interest of a number of authors (e.g., Cunningsworth, 1984, 1995; Tomlinson, 2013; Hutchinson & Waters, 1987; Sheldon, 1987; McDonough et al., 2013; Mc Grath, 2002, 2016). The authors offered valuable insights into the field by explaining the ‘what’ the ‘why’, and the ‘how’ of it. The present chapter is set to review the basic literature on EFL teaching materials evaluation. Indeed, the chapter provides definitions of evaluation, types of evaluation, steps of evaluation, principles of evaluation research design, and purposes of evaluation. In addition, the chapter considers the types of evaluation paradigms including logical positivist paradigm, postpositivist paradigm, constructivist paradigm, postpositivist paradigm, and transformative paradigm. Other elements that are examined are: definitions of EFL materials evaluation, the importance of EFL materials evaluation, textbook evaluation, program evaluation, program evaluation models, as well as the implementation of higher-level cognitive skills in teaching materials.

II-1-Evaluation Defined

Joint Committee (1994) defines evaluation as “the systematic assessment of the worth or merit of an object” (as cited in Stufflebeam & Coryn, 2014, p. 8). An important element to consider in this definition is the systematicity of evaluation. The latter requires evaluators to gather pertinent information about the-to-be evaluated materials in order reflect on their pros and cons. Stufflebeam (1999, p. 35), likewise, sees evaluation as a study whose aim is to sustain a given audience to see the merit and value of an object by putting emphasis on the critical aspects of effective evaluation such as objectivity and validity.

Clearly, the term ‘value’ that is the root of ‘evaluation’ indicates that value judgments are inherent to evaluations, in the sense that evaluations are not ‘value-free’ (Scriven, 1993, as

cited in Stufflebeam and Coryn, 2014, p. 8). The kinds of values that can exist in evaluation may incorporate “effectiveness, efficiency, usability, cost, safety, legality, and so on” (Stufflebeam & Coryn, 2014, p. 8). Besides, Fitzpatrick et al., (2011) write: “More broadly, we define evaluation as the identification, clarification, and application of defensible criteria to determine an evaluation object’s value (worth or merit) in relation to those criteria” (p.7). In the context of EFL, the definition implies that evaluation should rest on arguable and valid criteria against which the value of the materials can be weighed.

According to Brown (1995) “evaluation might be defined as the systematic collection and analysis of all relevant information necessary to promote the improvement of the curriculum and to assess its effectiveness within the context of the particular institutions involved” (p. 24). The definition includes the critical elements of evaluation, namely: ‘systematization’, ‘collection and analysis of data’, and ‘context of use’. Such elements are to be emphasized for the sake of improving the to-be-evaluated materials, as well as judging their effectiveness.

The aforesaid definitions have as their crucial element ‘systematization’. In this regard, it is interesting to note that ‘systematisation’ involves “the thoughtful, planned deployment and permutation of particular elements (activity-types, language items) within an overall structure” (McGrath, 2016, p. 162). This proposes that evaluation should be theory-driven so that its findings and implications are likely to be fairly reliable.

Hutchinson and Waters (1987) define evaluation as “a matter of judging the fitness of something for a particular purpose” (p. 96). A good starting point for an effective evaluation might be to ask clear and objective questions targeting particular points of the evaluand. By way of illustration, an evaluator can assess the concordance between a given teaching materials, let us say, a textbook and students’ self-regulated learning, and this with the aim of uncovering the positive and negative points relative to the issue under study.



Figure 3. Evaluation Process (Suchman, 1967, p. 34)

II-2- Types of Evaluation

Cunningsworth (1995) singled out three types of evaluation: ‘pre-use evaluation’, ‘in-use evaluation’ and ‘post-use evaluation’ (p. 14). According to the author, the first type occurs before the material is being employed, and evaluation in this case aims at considering “future or potential performance” of the material. The second type occurs when the material is being employed as, for instance, in the assessment of a good but old material to decide whether to keep or replace it. The third type of evaluation is “retrospective” and it is used to figure out the positive and negative sides of the material that was being used for time and this evaluations helps make decisions regarding the adjustment or replacement material. Like Cunningsworth, Tomlinson (2011) offers the following:

Evaluation can be pre-use and therefore focused on predictions of potential value. It can be whilst-use and therefore focused on awareness and description of what the learners are actually doing whilst the materials are being used. And it can also be post-

use and therefore focused on evaluation of what happened as a result of using the materials (p.xiv).

It is to be indicated that the type of evaluation being applied in the present research is ‘post-use evaluation’. In clearer terms, the evaluation of the English textbook (New Prospects), the EFL program, as well as the EFL BAC exams (second subject) designed for third-year students in the Algerian Secondary Schools is post-use, or ‘summative evaluation’ as it is called by Scriven(1991, as cited in Rossi et al., 2004).

II 3- Steps of Evaluation

Nation & Macalister (2010) identified various steps in carrying out an evaluation, and of which we stress the following:

- 1** Find who the evaluation is for and what kind of information they need.
- 2** Find what the results of the evaluation will be used for – to improve the course, to decide whether to keep or get rid of the course.
- 3** Decide if the evaluation is necessary or if the needed information is already available (p. 123).

With regard to the first principle, this study has as its audience the course designers, the teachers, the learners and all those interested in materials evaluation in the field of English as a Foreign Language (EFL). In addition, the results of the evaluation, once they are published, can be used by stakeholders, namely the designers and the teachers who use the materials to get clear ideas about their positive aspects and what still needs improvement. Finally, the evaluation is necessary and this for two main reasons: the first is that this kind of evaluation is directly related to one inherent part of the teaching learning process and caring about the materials improvement is contributing to the enhancement of the whole process. The second reason is that much of the more recent research on materials evaluation has viewed it as a dynamic process in which the evaluator’s success is to a greater extent determined by his/her motivation to undertake a constructive evaluation.

II-4-Principles of Evaluation Research Design

A set of principles to be stressed in defining an evaluation design have been offered by Suchman (1967, p. 91) and they are paraphrased as follows:

- An evaluation design is set to facilitate evaluation in terms of an outline.
- The design should not be based on one hypothesis, but rather on a set of ‘alternative hypotheses’
- Because a unique perfect design does not exist; various methods using various designs can be adopted to test hypotheses.
- A research design is in its totality an arrangement laid down by several ‘practical considerations’.
- Evaluators can deviate from the evaluation research design by making sure that basic hints and guidelines are respected.

The principles state that any evaluation ought to be goal-oriented. Goal-orientedness is the foreground of the evaluation in the sense that it renders the evaluator more focused and concentrated to figure out the value and worth of an evaluand. In addition, choice of the appropriate methods for carrying out an evaluation stressing “practical considerations” should be an inherent part of any research design. Such a triangulation renders the evaluation process more flexible and the evaluator, then, becomes more creative and motivated to base his/her task on the multiple realities surrounding the evaluation process.

II- 5- Purposes of Evaluation

Many purposes are to be associated with evaluations. Indeed, evaluations may be carried out to “help management improve a program; support advocacy by proponents or critics; gain knowledge about the program’s effects; provide input to decisions about the program’s funding, structure, or administration; or respond to political pressures” (Rossi et

al., 2004, p. 40). In this respect, it is to be mentioned that stating the aims behind evaluations generally represents the initial state of the evaluation process.

The main purposes of evaluations are linked to ‘program improvement’, ‘accountability’, as well as ‘knowledge generation’ (Chelimsky, 1997, as cited in Rossi et al., 2004, p. 41). First, ‘**program improvement**’ is related to that type of evaluation which is carried out to improve a program, and it is named formative evaluation (Scriven, 1991, as cited in Rossi et al., 2004, p. 41). This is because a formative evaluation mainly purports to render the program more effective targeting results that are specifically ‘timely’, ‘concrete’, and ‘immediately useful’ (Rossi et al., 2004, p. 41).

Additionally, ‘accountability’ is involved in the type of evaluation that is ‘summative’ (Scriven, 1991, as cited in Rossi et al., 2004, p. 42). The main idea linked to accountability is that program managers are supposed to satisfy those companies, institution, or persons who supported them to design the program (Rossi et al., 2004, p. 42). This can be attained by considering the multiplicity of the factors affecting the success of the program such as: good learning objectives, students’ motivation and level, good in-put and out-put, and effective assessment strategies.

The third purpose of evaluation is ‘knowledge generation’. This might allow those interested in the field to gain insights into new findings and assumptions in that an evaluation might be initiated by a researcher to assess the effectiveness and workability of program whose design is based on a theory or in other terms ‘*an innovative science curriculum.*’ The findings of evaluations in such instances can be published in journals, monographs, or other academic sources (Rossi et al., 2004, pp. 42-43). With relation to such a purpose, the findings of the evaluation can be used by others for ‘rehabilitation programs’ (Linfield & Posavac, 2019, pp. 24-25).

II-Paradigms to Evaluation

A set of paradigms to evaluation has been designed and they are discussed in the following paragraphs.

II-6-1- Logical Positivist Paradigm

It is from social sciences mainly education and psychology that pioneering evaluations stemmed and this when positivism was the prevailing paradigm. Logical positivism (a branch of positivism) holds that there exists one reality of things that should be discovered objectively following scientific standards. Under this paradigm research is peculiarly done quantitatively. The main tenet of positivism is ‘objectivity’ (Fitzpatrick et al., 2011, pp. 114-115). It follows from this that evaluations done from a logical positivist perspective are meant to be based on what is quantifiable and objectively interpretable.

II-6-1-2-Postpositivist Paradigm

It is in response to logical positivism that postpositivism appeared (Fitzpatrick et al., 2011, p. 15). According to Reichardt and Rallis (1994) post positivists acknowledged that in research the methods, facts, and investigation choices are impacted by the researcher’s values in that knowledge is not complete and static, that multiple theories can be involved in data explanation, and that it is people and their experience that build reality (as cited in Fitzpatrick et al., 2011, p. 15). The core idea that is associated with postpositivism is that the research findings may be biased by the researcher’s personal attitudes and values and that evaluation is not meant to be totally objective.

II-6-1-3-Constructivist Paradigm

This paradigm takes into account the various “differing “realities” or conditions or life experiences” of the users of programs. Program designers aim at getting insights into their audience’s conditions so that their programs could be improved. Under this paradigm “values were an integral part of what programs, policies, and evaluations confronted.” And any evaluation that excluded those values was meant to be ineffective (Fitzpatrick et al., 2011, p.

116). To the point and following Schwandt's (1997) concept "localness" of knowledge "evaluation is intended to provide understanding of a particular program and its context and is less concerned with generalizability and developing laws and theories for other settings" (as cited in Fitzpatrick et al., 2011, p.116). This means that peculiarity is a foundational feature of evaluation; because, each evaluation can be viewed as being context-dependent.

The 'localness' criterion within the constructivist paradigm can be made clearer by making reference to Ur (1996) who distinguishes between general criteria that are applicable to any effective teaching material, and specific criteria that are peculiar to a given context. For example, to evaluate coursebooks, Ur (1996) cites examples of general criteria such as: "interesting topics and tasks.", "varied topics and tasks, so as to provide for different learner levels, learning styles, interests, etc." and examples of specific criteria like "approach is educationally and socially acceptable to target community" and " readily available locally" (p. 194).

II-6-1- 4- Transformative Paradigm

The transformative paradigm resembles to the constructivist one in that it considers the various "realities" that ought to be involved in evaluation. Nevertheless, under the transformative paradigm stress is on what shape those realities in terms of political, social, and economic factors (Fitzpatrick et al., 2011, p. 116).

II-7- EFL Materials Evaluation

II-7- 1-EFL Materials Evaluation Defined

Tomlinson (2011) views materials evaluation as: "The systematic appraisal of the value of materials in relation to their objectives and to the objectives of the learners using them"(p. xiv).This shows that materials evaluation represents a method for figuring out the significance of given materials considering the objectives for which they have been designed. Tomlinson (2003), too, sees that "materials evaluation is a procedure that involves measuring

the value (or potential value) of a set of learning materials” (as cited in McDonough, 2013, p. 50). This definition suggests that a set of sound and reliable criteria for properly weighing the value of the teaching materials should be followed by the evaluator. It is by doing so that biased results can, to a larger extent, be avoided.

To select the most relevant materials, evaluation needs to be based on two fundamental questions: “What does this tell you about the author's view of language and/or learning?” and “Do you agree with this view?” This is entailed in the principle stating that “the more information the evaluator can gather about the nature of a textbook, the better will be the choice.” It appears from this two-part question that materials evaluation is principally “a matching process in which the needs and assumptions of a particular teaching-learning context are matched to available solutions” (Hutchinson, 1987, p. 41). Four stages are involved in this matching process:

1. Define the criteria on which the evaluation will be based.
2. Analyse the nature and underlying principles of the particular teaching/learning situation.
3. Analyse the nature and underlying principles of the available materials and test the analysis in the classroom.
4. Compare the findings of the two analyses. (Hutchinson, 1987, p. 41)

The four criteria provided by Hutchinson need to be stressed thoughtfully. By doing so, the findings to reach through the evaluation process are therefore more likely to be reliable and valid. In addition, an evaluation that is based on Hutchinson’s criteria seems to have a set of crucial components. Firstly, there should be clear criteria on which to base the evaluation. Secondly, there is deep analysis of the teaching/learning situation in which the materials will be used. Another crucial component deals with the analysis of the core principles of the to-be evaluated materials and an assessment of the principles while using the materials with the students. Finally, there should be a careful consideration of the results obtained through the two evaluations: the evaluation of the materials when they are not being used in the teaching/learning process, and their evaluation while they are being used in the classrooms.

II-7-2-The Importance of EFL Materials Evaluation

Nation and Macalister (2010) state that “carrying out an evaluation is like carrying out research, and it is thus critically important that the evaluator is clear about what question is being asked. That is, why the course is being evaluated” (p. 123). The quotation points toward the necessity to make use of one of the basic principles of research; that is, being completely aware of the reason for doing the evaluation. Put it in a nutshell, it is this awareness that might allow the evaluator to embark on the field of evaluation constructively.

The importance of materials evaluation is shown by McDonough (2013) who states that “the ability to evaluate teaching materials effectively is a very important professional activity for all English as a Foreign Language (EFL) teachers” (p. 50). This taps into teachers’ task to make judgments about the effectiveness of the teaching materials they use. For so doing, careful consideration of what determines the value of the materials in terms of checklists and approaches is vital. Along similar lines, Hutchinson (1987) argues that awareness can be developed by materials evaluation in various ways. For example, it requires teachers to delve into the analysis of “*their own presuppositions*” regarding the nature of instruction (pp. 42-44). Teachers, accordingly, might see how certain of their practices are not in accordance with what they have as established knowledge about language learning. Materials evaluation, too, permits to determine which textbook will better fit the teaching/learning process. In brief, the evaluation of materials should not be limited to the immediate selection of teaching materials. Rather, it should also help raising teachers’ awareness about the aspects of the target language (Hutchinson, 1987). More importantly, in clarifying the importance of materials evaluation, Hutchinson and Waters (1987) write that “Material evaluation can and should be a two-way process which enables teachers not just to select a textbook, but also to develop their awareness of their own teaching and learning situations” (pp. 37-38).

Effective materials evaluation can be achieved when evaluation is viewed as an enterprise with solid scientific foundations. Attitudes towards materials evaluation for language teaching may greatly affect, either positively or negatively, the type of data to gather and the procedures and criteria on which to base data analysis. In this regard, Nation and Macalister (2010) estimate that a well-done evaluation represents an endorsing and encouraging endeavor. With this in mind, the evaluator can be highly motivated and curious to see his/her research results taken into account by stakeholders.

II-8- Textbook Evaluation

The teaching/learning process can be facilitated through the use of teaching materials that fit the students' needs and interests. One of the mostly used materials throughout the world is the textbook. In this vein, Hutchinson and Torres (1994) suggest: "The textbook is an almost universal element of ELT teaching...No teaching-learning situation, it seems, is complete until it has its relevant textbook" (p. 315). The quotation portrays textbooks as crucial elements of any EFL teaching leaning situation. With this in mind, textbook evaluation might represent a worthwhile field of inquiry in which evaluators look for the best ways leading to textbooks improvement.

Additionally, Hutchinson and Waters (1994) claim "There seems, then, to be a substantial case for regarding textbooks as effective agents of change... the good textbook, properly used, can provide an excellent vehicle for effective and long-lasting change" (p. 323). The authors add "We generally think of textbooks as providers of input into classroom lessons in the form of texts, activities, explanations, and so on"(p. 317).

Moreover, Prabhu (1987) sustains: "It is common to regard materials which are 'tightly constructed' (or fully specified) as being commendable on the grounds that they make teachers' work easy and ensure a uniformity to the work that takes place in different classrooms, in spite of differences between teachers" (p. 96). Prabhu's standpoint is

principally applicable to teaching materials such as textbooks and programs through which harmony and standardization can be achieved.

It is possible to have a clear understanding of the importance of textbook evaluation by having a closer look at its basic function in that, an effective selection of a textbook is fundamentally determined by an evaluation that displays its positive and negative points. The point can be made clearer by citing Sheldon (1988) who argues that selecting a specific teaching material stems from concrete educational work that entails considerable investment on the behalf of professionals and those involved in finance and politics. Such a great status points towards systematic and criteria-driven textbook evaluation.

In addition to what has been explained previously about the types of evaluation, the literature on textbook evaluation indicates that the domain incorporates three main methods. Indeed, McGrath (2016) writes: “the impressionistic method, the checklist method and the in-depth method” (p. 31). All the methods can be used for evaluating any teaching/learning materials. The impressionistic method is adopted to get a broad insight into the materials being evaluated, and it is to be mentioned that it is not enough to rely on this type of evaluation for selecting and evaluating textbooks. Another method for evaluating teaching materials is the checklist method. Of the advantages of the method there are:

- 1/ It is *systematic* in that it ensures the verification of the whole basic items under evaluation.
- 2/ It is *cost effective* in that it allows the evaluator to collect a large set of information in a comparatively brief period of time.
- 3/ The information is collected in “a *convenient* format” permitting the evaluator to easily compare the “*competing sets of material*” with one another.
- 4/ It is *explicit and*, offers a *common framework for decision-making*. (McGrath, 2016, pp. 32-33)

As for as the in-depth evaluation is concerned, McGrath (2016) clarifies that: “In-depth techniques go beneath the publisher’s and author’s claims to look at, for instance, the kind of language description, underlying assumptions about learning or values on which the materials are based” (pp. 27-28). In the definition two linked assumptions about in-depth evaluation are made: (1) one suggests that in-depth evaluation techniques are mainly used to examine the nature of the designers’ beliefs underlying the materials under evaluation; (2) the other proposes that in-depth evaluation intends to determine the degree to what the designed materials could be effective in helping the target audience reach the objectives set by the designers.

II-9- Program Evaluation

II-9-1 Program Evaluation Defined

According to Patton (1996), “program evaluation is the systematic collection of information about the activities, characteristics, and outcomes of programs to make judgments about the program, improve program effectiveness, and/or inform decisions about future programming” (p. 23). Such a definition sheds light on the final aim of program evaluation which is tied to the improvement or change of the program.

Moreover, Brown (1995) defines program evaluation as an ongoing process “of information gathering, analysis, and synthesis, the entire purpose of which is to constantly improve each element of a curriculum on the basis of what is known about all of the other elements, separately as well as collectively” (p. 24). He adds “Such a continuing process of evaluation makes possible the assessment of the quality of a curriculum once it is put in place as well as the maintenance of that curriculum on an ongoing basis.” Brown’s definition of program evaluation portrays it as a dynamic process that has its potential to ensure quality program. Above all, after the data gathering step the evaluation should be done analytically and synthetically with a goal of improving each aspect of the program under evaluation.

II-9-2- Program Evaluation Models

A number of program evaluation models have been suggested in the literature. For example, 23 different models have been listed by Stufflebeam and Coryn (2014, as cited in Linfield & Posavac, 2019, p.34). Even if differences exist among the models, their crucial aim remains the same: “to shed light on the value and worth of programs through a range of methods or from different perspectives” (Stufflebeam & Coryn, 2014, as cited in Linfield & Posavac, 2019, p.34). The following table illustrates four general approaches to program evaluation.

Table 3

Characteristics of Some Basic Evaluation Models (Adopted from Linfield & Posavac, 2019, p. 36)

Model	Brief Description	Strengths	Weaknesses
Black Box	The focus is exclusively on outcomes, not considering mechanisms or other explanations why the outcomes occur.	The simplicity is attractive to some stakeholders. Evaluations can be completed more quickly and less expensively.	This approach is increasingly seen as too simplistic and inadequate to provide necessary insight into important elements such as mechanisms.
Objectives Based	This approach accepts the objectives of the organisation as the outcomes without critique. It is especially common in accreditation of educational institutions.	It is seen as particularly fair because programs are evaluated on the basis of what they explicitly claimed they intended to accomplish.	In many services, there is general agreement of what is valuable regardless of whether the organization agrees. This approach does not address agreement on goals in the field.
Theory Based	Appropriate theories from the relevant literature inform this evaluation—indicating the expected outcomes and mechanisms.	There is a good match to current research and evidence, which raises expectations for excellence.	To the degree that the organization was unaware of the most recent research or unable to change to address it. Stakeholders can feel that the standards were switched on them.

Capacity Building/ Empowerment (These two labels are sometimes considered separately, but they are often seen as related if not the same.)	One primary purpose is to conduct an evaluation with the agency staff to demonstrate Program Evaluation knowledge and skills with a goal of helping staff be able to conduct some level of future evaluations.	Collaboration often yields more comprehensive information and insights. Training internal evaluators strengthens future agency work.	Depending on how empowerment is handled, agency evaluators could over-emphasize positive findings and downplay or even ignore negative ones.
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Under the simple Black Box Model “evaluation considers whether program participants are better off following the program than they were before without examining anything else about the process such as why they are better off or why some participants improve more than others.” As regards the Objectives-Based Model, it is used to evaluate the programs in relation to the attainment of the objectives set by organizations and institutions. With relation to the Theory-Based Model, evaluators aim at evaluating elements of the program relying on theories available in the literature. Finally, the main idea behind the Empowerment or Capacity-Building approach “is that instead of primarily providing the product of an evaluation of a program, these evaluators provide the service of training agency staff how to evaluate their own program”(Linfield & Posavac, 2019, pp. 34-35).

II-10- The Implementation of Higher-level Cognitive Skills in Teaching Materials

About the integration of higher-level cognitive skills in language teaching materials, Islam and Mares (2014) argue:

Encouraging higher-level cognitive skills means adapting materials in such a way as to require students to hypothesize, predict, infer, make connections and associations and visualize. This type of higher-level cognitive activity engages and motivates students as well as assists in transferring language skills already developed in their first language to the target language (p. 90)

Designed effectively, teaching materials and particularly EFL materials are meant to be quality materials that encourage students to get exposed to tasks stressing higher-cognitive skills. Through the materials, students' exposure to creative problem-solving is central. The designers' main goal can be interpreted in terms of their assumptions to stimulate the students' creative abilities by generating solutions to creative problems.

Conclusion

Discussed in the chapter are the main concepts that are relative to EFL materials evaluation principally definitions of evaluation, its types, steps and methods of evaluation, the definitions and importance of EFL materials evaluation. This has been done by making reference to the leading authors in the field of EFL teaching materials development and evaluation like Tomlinson, Cunningsworth, and McGrath. Furthermore, the importance of implementing higher-order thinking skills in EFL materials has been tackled and discussed.

Finally, building on from the examined literature two concluding remarks can be set forth. First, most of the works consulted and reviewed stress the theoretical points of problems, and the ways to implement problem solving in instruction has received very little attention. Second, in spite of the high number of studies carried out in the field of problem solving, very few works have mentioned the testing of problem solving in the academic contexts, particularly teaching materials and teachers' views.

Part Two:

**Presentation of the Methodological
Approaches, Research Findings, and
Discussion**

Chapter Three: Research Design and Methodology

Introduction

In this chapter, the focus is on the research methodology. The chapter explains the data collection and analysis methods, triangulation, as well as the rationale for the use of mixed-method research. It is to be pointed out that in the present study the terms research methods and research methodology are not being used interchangeably. In showing the distinction between the two, Newby (2014) writes: “Research methodology is concerned with the assembly of research tools and the application of appropriate research rules. Research methods are the research tools themselves, for example, questionnaires, observation, statistical analysis” (p. 53). In Newby’s formulation, research methodology involves an interweaving of a range of research tools to investigate a given issue or phenomenon using questionnaires, observations, and statistical analysis. The effectiveness of any research is determined by the way the tools are used by the researcher.

III-1- Defining Qualitative Research

A range of definitions has been provided to qualitative research. For example, a definition by Bryman (2008) states that “qualitative research is a research strategy that usually emphasizes words rather than quantification in the collection and analysis of data” (as cited in Hammersley, 2011, p 1). This means that qualitative research does not regard numerical data. Rather, its scope is linguistic content.

Leavy (2014) states that qualitative research allows to get knowledge about social phenomena and its approaches can be employed to investigate a large set of topics across disciplines. Implied in this definition is the idea that qualitative research allows researchers to gather a large set of data in various domains. Again, regarding qualitative approaches to research, Leavy (2014) adds: “In the social and behavioral sciences, these approaches to research are often used to explore, describe, or explain social phenomenon; unpack the

meanings people ascribe to activities, situations, events, or artefacts” (p. 1). The quotation indicates that qualitative research in social and behavioral sciences is primarily related to the investigation of issues that chiefly involve human activities. This has direct and deep implications for the field of education wherein communication between students and teachers is more than necessary. In the present study, the qualitative research aims at interpreting qualitative data gathered by the means of corpora or a questionnaire with respect to problem solving in EFL in the Algerian-Third Year Classes.

III-2- Quantitative Research and its Categories

Quantitative research is defined by Brown(2011) as any type of research that is based on numerical data and meanings that could be generated from the data. He classifies it into ‘descriptive’, ‘exploratory’, ‘quasi-experimental’, and ‘experimental’. In drawing the distinctions between qualitative and quantitative research, Kumar (2011) clarifies that the main distinctions between qualitative and quantitative research suggest that flexibility regarding explanation, description, and exploration of views, attitudes and feelings is the main tenet of qualitative research, whereas in quantitative one structuredness and fixedness are the focal features.

In the present study, the categories of the quantitative research include: **1/ Survey, 2/ Document analysis**, and (3) and **experimental research**. For a more comprehensive account of the distinction between quantitative and qualitative approaches, Figure 4 is used.

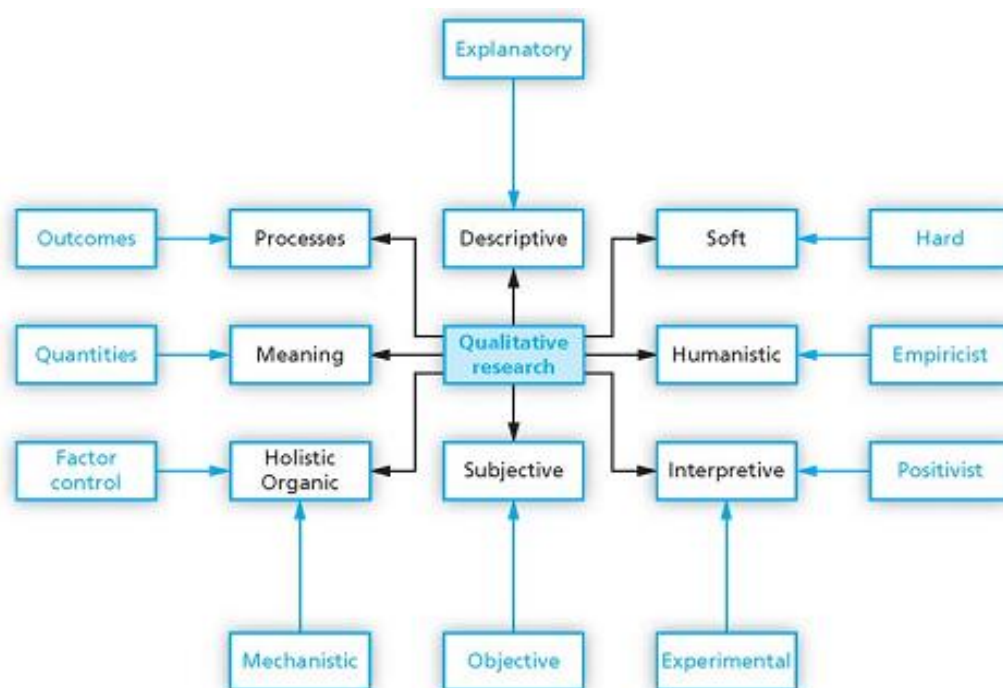


Figure 4. Distinction between Quantitative and Qualitative Approaches (Adopted from Newby, 2014, p. 104)

Figure 4 shows that the descriptive terms associated with qualitative research are: ‘descriptive’, ‘subjective’, ‘soft’, ‘humanistic’, ‘interpretive’, ‘processes’, ‘meaning’, ‘holistic’, and ‘organic’. On the other hand, the quantitative research includes terms which are: ‘explanatory’, ‘objective’, ‘experimental’, ‘mechanistic’, ‘hard’, ‘empiricist’, ‘positivist’, ‘outcomes’, ‘quantities’, and ‘factor control’.

III-3- Research Design: Mixed Research Method

III-3- 1- Mixed Method Defined

According to Dörnyei (2007) “mixed methods research involves different combinations of qualitative and quantitative research either at the data collection or at the analysis levels. Typical example: consecutive and interrelated questionnaire and interview studies” (p.24). Such a combination allows researchers to get varied insights into the issue under investigation. By so doing, the scope of investigation becomes wider and clearer, in the sense that the meanings of the numerical data can be made clearer when they are associated

with qualitative data that enlighten and explain them. Several definitions have been given to mixed methods research. For example, Johnson et al. (2007) made a review of the definitions and they offered the following:

Mixed methods research is an intellectual and practical synthesis based on qualitative and quantitative research; it is the third methodological or research paradigm (along with qualitative and quantitative research). It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced, and useful research results (p. 129).

The quotation pinpoints to the idea that the mixed methods research provides researchers with the necessary methodological tools that enable them to attain valid results. Thus, from a methodological perspective, it is worth noting that the more the data are collected the more the research would be deeper and thorough.

To attract attention to the usefulness of mixed-methods research, Brown (2011) states “from my point of view, those who can use both quantitative and qualitative methods and can use them to reinforce and cross-validate each other will be stronger researchers” (p. 199). This is because various variables that are linked to the research can be explored and, thus, the generalizability of the research findings becomes larger and more valid.

III-3-2- Rationale for Using Mixed Methods Research

Bearing different facets and involving various parts, many issues in education cannot be adequately and efficiently explored following one methodology. Indeed, many scholars have started to employ “*mixed methods*” to investigate educational issues. In mixed methods, different methods are used by researchers for one study. Using mixed-methods research contributes a large set of insights to the present research. Insights range from the most tangible: the number of activities that relate to problem solving in the assessment parts of the

textbook *New Prospects*, for example, to more abstract ones involving attitudes and beliefs as, for instance: How do EFL teachers view problem solving in the Algerian secondary schools exam classes? The most significant advantage of this method is that it permits deep understanding and exploration of the research questions, as well as the access to a thorough examination of the complexity of the subject under study. Finally, mixed-methods approach holds promise to establish a strong bridge between the practical side of the study and the existing literature on problem solving in English language teaching and learning.

III-3-3-Triangulation

In many cases, one research method cannot serve the needs of researchers who look for the appropriate ways to investigate issues that need to be considered and explored from different angles. Accordingly, *triangulation* came to be an effective coalescence of a set of methods to be used to study language issues thoroughly. In this vein, Denzin (1978) defines ‘triangulation’ as “the combination of methodologies in the study of the same phenomenon” (p. 291). This means that by making use of triangulation researchers would have flexibility, as well as reaching synthesis in their studies. About the various types of triangulation, Miles and Huberman (1994) highlight:

What kinds of triangulation can there be? Following Denzin’s classic distinctions, we can think of triangulation by *data source* (which can include persons, times, places, etc), by *method* (observation, interview document), by *researcher* (investigator A, B, etc.), and by *theory*. To this we can add *data type* (qualitative text, recordings, quantitative) (p. 267).

In addition, McLaughlin (1990) articulates “data triangulation is achieved most often through the work of different researchers with varied interests getting a fix on the same phenomenon from different angles.” More importantly, the author clearly expressed his position towards the use of a multimethodology for research in the following terms “I side with those

philosophers of science who argue that truth can never be known directly and in its totality” (p. 618). To make things clearer, Figure 5 is developed.

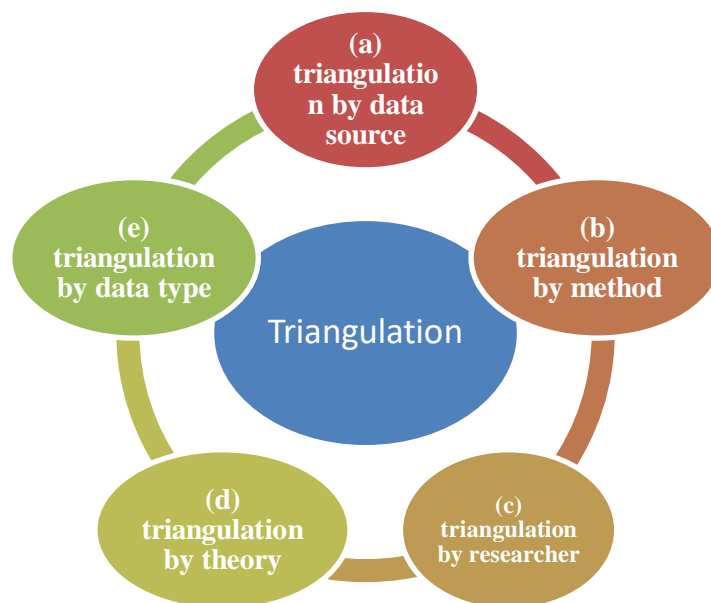


Figure 5. Triangulation in SLA research (Based on Miles & Huberman, 1994, p. 267)

On the basis of what has been mentioned, the types of triangulation are: **(a)** triangulation by data source, **(b)** triangulation by method, **(c)** triangulation by researcher, **(d)** triangulation by theory, and **(e)** triangulation by data type.

As far as the present study is concerned, triangulation is to be explained and illustrated in the following parts:

(a) Triangulation by data source: The study gets its data from several sources: An official textbook (New Prospects), 3YSS EFL program, official examinations (EFL BAC examinations, Second Subject), third-year secondary schools EFL teachers and third-year secondary schools EFL students involved in an experimentation

(b) Triangulation by method: The study adopts a mixed-method approach used in data collection and data analysis for the sake of reaching reliability and validity.

(C) Triangulation by theory: The study adopts a wide range of theories including: Bloom’s Taxonomy (1965), Polya’s problem solving model (1967), Quellmalz’s taxonomy (1998),

Marzano’s Taxonomy (2001), the 3C3R Model by Hung (2006), and Cognitive Flexibility Theory by Spiro et al. (1984).

(e) Triangulation by data type: The present research was carried out on the basis of two types of data: qualitative and quantitative data. In this vein, Richards(2011) estimates that “Triangulation of data involves drawing together different sources in order to develop a robust “fix” on the case while at the same time allowing for the subtle nuances of interpretation and insight that multiple perspectives can provide” (p.213).

III-4- Procedures of Data Collection

III-4-1- Description of the Corpus

III-4-1-1- *New Prospects*

New Prospects is the official English textbook designed by the Algerian Ministry of Education for third-year classes in the Secondary School. The textbook complies with the recommendations of the New English syllabus for 3YSS developed within the recent educational reform which aimed at adopting the Competency Based Approach to Language Teaching (CBALT). *New Prospects* comprises six units as presented in Table 4.

Table 4

The Six Units with their Themes in New Prospects

The Units	The Themes
(1) Exploring the Past	Ancien tCivilizations
(2) ILL- Gotten Gains Never Prosper	Ethics in Business: Fighting Fraud and Corruption
(3) School : Different and Alike	Education in the World: Comparing Educational Systems
(4) Safety First	Advertising, Consumers and Safety
(5) It’s Giant Leap For Mankind	Astronomy and The Solar System
(6) Keep Cool !	Feeling, Emotion, Humour and Related Topics.

Every unit of the textbook contains two parts: “*Language Outcomes*” and “*Skills and Strategies outcomes*”. The first part is, in its turn, divided into “*Listen and Consider*” and “*Read and Consider*”. The focus of these two sequences is the study of the grammatical

structures, vocabulary, pronunciation and spelling so that to prepare the students to the second part of the unit: “*to speak*”.

III-4-1-2-Teacher’s Book

In addition to collecting data from *New Prospects*, the Teacher’s Book that is also designed by the Algerian Ministry of Education for third-year classes in the Secondary School has been served as a source for data collection. Indeed, it is to be indicated that in order to get the results of the second assessment part ‘**skills and strategies assessment**’ of *New Prospects* reference should be made to the teacher’s book where the tests are included. At this stage, the teacher’s book includes only two tests. The test of unit one (see Appendix 1) is a model that teachers are required to follow in the units: 2, 3, 4, and 6. Thus, the results of the test of unit one are applicable to units 2, 3, 4, and 6. As regards unit 5, the test designed for this unit is completely identical to that of unit 1. This suggests that the results of units: 1, 2, 3, 4, 5, and 6 are the same.

III-4-1-3- The English Program Designed for BAC Classes

The English Program was designed by the Algerian Ministry of Education in March 2006 to Third-Year Classes preparing for Baccalaureate all streams: Mathematics/Technical science- Mathematics/Experimental Sciences/ Management- Economy/Letters/Philosophy/Foreign Languages. The program opens with the table of contents, and it is written in French (only some exceptions in English) and the translation of the contents to English is mine. The program has ten contents and they are presented and described in the following:

1. Introduction : Finalités de l’enseignement de l’anglais dans le cycle secondaire
1. Introduction : The objectives of teaching English in the Secondary Schools
2. Objectifs généraux de l’enseignement de l’anglais en 3è AS
2. The general objectives of teaching English in Third-Year Classes
3. Profil d’entrée en 3è AS
3. The profile of entrance into Third-year classes.
4. Objectif terminal d’intégration (O.T.I.) : Profil de sortie de l’élève de 3è AS
4. The final objective of integration: Student’s profile at the end of Third-year Education

5. Objectif intermédiaire d'intégration (O.I.I.)
5. The intermediary objective of integration
6. L'approche par compétences : une pédagogie de l'intégration
6. Competency-based Approach: a pedagogy of integration
7. Apprentissages propres à la discipline : Compétences à maîtriser en 3^e AS
7. Learning specific to the discipline: The competencies to master in Third-year S S
8. Ressources de la compétence
8. Resources of the competency
9. Projets proposés communs aux deux filières
9. Suggested projects common to the two streams
- 9.1. Description des projets en termes de ressources
- 9.1. Description of the projects in terms of resources
- 9.2. Structure des projets et exemples d'activités
- 9.2. Structure of the projects and samples of activities
10. Evaluation des acquis
10. Assessment of students' acquired knowledge
- 10.1. Types d'évaluation
- 10.1. Types of assessment
- 10.2. Comment fonctionne l'évaluation des acquis ?
- 10.2. How does the assessment of the acquired knowledge function ?
- 10.3. Gestion des critères d'évaluation
- 10.3. Management of the assessment criteria

Content one indicates that English teaching aims at developing the three types of knowledge: 'savoir', savoir-faire', and 'savoir-être' meaning respectively in English: know-what, know-how-to-do, and know-how-to-be so that the students develop the three competencies: (1) interact orally, (2) interpret messages, and (3) produce messages.

Content two deals with 'the general objectives of teaching English in Third-Year Classes. First of all, the 'linguistic and communication objectives' are set to: (a) provide the learners with a solid linguistic base and (b) allow them to reach clear understanding and effective communication in English. Second, the 'methodological/technological objectives' are mainly set to: (a) consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation and (b) to help students know how to rationally use the oral and written documentation in English. Thirdly, the 'Socio-cultural and socio-professional objectives' are designed to: (a) promote interdisciplinarity and (b) stimulate the students' curiosity and open-mindedness.

Content three deals with the profile of entrance into third-year classes. Indeed, the designers mention that the students' profile should reflect their capacity to produce, from a text that is imaged or not, spoken or written, a statement of about fifteen lines in terms of a report stressing the situation of communication presented in the instruction.

In content four, it is indicated that the final objective of integration is: In a communicative situation, the students must produce a twenty-line message, in a chosen written discourse (descriptive, narrative, argumentative, expositive, injunctive) in a correct and legible way.

As to content five, it is written in the program that the competency-based approach is based on the pedagogy of integration, which offers a moment of discovery, observation, application, reformulation, and control. The pedagogy of integration is adopted to make learning more effective using various types of knowledge to solve new problems. This view of learning is to be held through learning situations (or exploratory situations) and situations of integration (or reinvestment situations), which are new for the students.

Content six suggests that on the basis of the terminal objective of integration, three competencies should be mastered at the end of the third-year secondary school. These competencies are **interaction**, **interpretation** and **production** of various messages.

Content seven deals with 'resources of the competency' including: (a) *des situations d'apprentissage* (Project Outcomes) et *des situations d'intégration* (Learners' Outcomes), (b) *des savoirs/ contenus linguistiques* (Language Outcomes), (c) *des savoir-faire* (Skills and Strategy Outcomes) , (d) *des savoir-faire technologiques* (*Technological and Computer Skills*), and (e) *des savoir-être* (Intercultural Outcomes/ Social Skills Outcomes).

Content eight is a matter of selecting four (4) to five (5) projects for each stream for the study year, as shown in Table 5.

Table 5

Proposal for Selection of Projects in the Curriculum According to the Streams

Projets	Maths/Tech-Maths/Sc Exp/Gestion-Economie	Philo/Litt./Langues Etrangères
1. Ancient Civilisations		**
2. Ethics in Business	**	**
3. Education in the World	*	**
4. Advertising, Consumers and Safety	**	*
5. Astronomy and the Solar System	**	*
6. Feelings and Emotions	**	**

Content nine of the program deals with a set of projects to be done by the students. The part is written in English. The students are basically encouraged to do their projects by using Information communication technologies (ICTs).

In content ten, it mentioned that assessment can be diagnostic, formative, and summative. As regards ‘diagnostic assessment’, it takes place at the beginning of the teaching/learning process through a battery of tasks. As to formative assessment, the program designers explain that it is integrated into the learning process and is done at any time and it is not necessarily done for marks. Summative evaluation takes place at the end of instruction.

III-4-1-4- BAC Exams

The BAC exams are national and official. They are designed by the National Ministry of Education to assess third-year secondary school students at the end of the year of study. The students who pass the exam can go to learn at the university. The BAC exams include two parts. The first part refers to **“Reading Comprehension”** which in its turn includes two sections. The first section is called **“Comprehension”** while the second is called **“Text**

Exploration” and it relates to lexis, grammar, phonetics and other language forms. On the other hand, the second part is named “**Written Expression**”, and it is principally designed to assess the students’ competencies in writing. In this part, the students are generally provided with hints.

III- 4-2- Questionnaire

Questionnaires have been defined by Brown (2001) as “any written instruments that present respondents with a series of questions or statements to which they are to react either by writing out their answers or selecting them among existing answers” (as cited in Mackey & Gass, 2005, p. 92). Questionnaires allow access to a large set of data. In this regards, Dörnyei (2007) contends that survey studies, mainly questionnaires, are of the most frequent data collection methods regarding attitudes and views from vast numbers of respondents. In addition, by using questionnaires researchers are likely to collect data the respondents can “report about themselves, such as their beliefs and motivations about learning or their reactions to learning and classroom instruction and activities—information that is typically not available from production data alone” (Mackey & Gass, 2005, pp. 92-93). A semi-structured questionnaire involving close and open-ended questions is used in the present study.

III- 4-2- 1- Description of the Questionnaire

The questionnaire is composed of three sections. The first section is entitled ‘General Information about the Participants’ and it relates to the respondents’ professional experience, professional training and academic degree. The second section entitled ‘Teachers’ Views about the Implementation of Problem Solving in the Classroom’ seeks to figure out how teachers see problem solving in terms of difficulty, importance and advantages. As regards section three, it is named ‘Teachers’ Views about the Teaching of Problem Solving Strategies and Procedures’. The section

addresses the teaching of problem solving strategies and approaches, teachers' involvement of students in individual and collaborative problem solving, as well as teachers' views about the implementation of problem solving tasks in the classroom.

III- 4-2- 2- Piloting the Questionnaire and Conducting Item Analysis

To construct questionnaires effectively, stress should be on 'field testing' or "piloting the questionnaire at various stages of its development on a sample of people who are similar to the target sample the instrument has been designed for"(Dörnyei, 2003, p. 63). There is no doubt, of course, that the piloting phase is a key to the improvement of the questionnaire with respect to its content and form. With regard to our study, the piloting phase lasted three weeks. The questionnaire was piloted with teachers who belong to the target sample, as well as with teachers at university level and who have experience in the field of research. The final objective of our piloting was to design a questionnaire that is reliable, clear, and easy to answer.

About the importance of the piloting phase Sudman and Bradburn(1983) warn that "if you do not have the resources to pilot-test your questionnaire, don't do the study" (as cited in Dörnyei , 2003, p. 64) This implies that for a survey research to take place effectively, researchers are called on to pilot their questionnaires to obtain reliable and valid data. The piloting phase helped to make some changes in the questionnaire. Table 6 illustrates the construction process.

Table 6

The Piloting Phase of the Questionnaire

The items before the piloting phase	The items after the piloting phase
1/ What might be the consequences of not implementing problem solving in the classroom?	1/ What might be the benefits of implementing problem solving in the classroom? ● <u>Comment</u>
	After the piloting phase, stress has been on

2/ How far do you agree or disagree with the statement: “There is no effective instruction without effective problem solving tasks.”

the benefits of implementing problem solving in the classroom and not on the consequences of not implementing it. By so doing, the importance of problem solving has been emphasized and highlighted more.

2/ How far do you agree or disagree with the statement: “There is no effective teaching/learning process without effective problem solving tasks.”

●Comment:

After the piloting test, the word ‘instruction’ has been replaced by the expression teaching/learning process. This has made the question clearer and helped avoid ambiguity.

III- 4-2- 3- The Target Population and Sampling

With regard to the point under discussion, it is worth mentioning that “the sample is the group of people whom researchers actually examine and the population is the group of people whom the survey is about” (Dörnyei, 2003, pp. 70-71). The target population of the present study involves EFL teachers of schools from two Algerian provinces: Tizi-ouzou and Bouira. In more precise terms, all the teachers are teaching EFL for students who are preparing their Baccalaureate Examination.

The present study adopts a random sampling. At this stage, Dörnyei, (2003) states: “*the key component of scientific sampling procedures is random sampling. This involves selecting members of the population to be included in your sample on a completely random basis*” so that get reliable and valid results (p. 73).As regards the sample size, the number of the gathered questionnaires is fifty (50). At this level, Dörnyei (2003) explains: “From a purely statistical point of view, a basic requirement is that the sample should have a *normal distribution*, and a rule of thumb to achieve this, offered by Hatch and Lazaraton (1991), is that the sample should include 30 or more people”(p. 74). The quotation suggests that if the

sample includes 30 people of the target population it is considered as a being valid. In addition, about the sampling Dörnyei (2003) adds

From the perspective of *statistical significance* (cf. Section 4.3. 6), the principal concern is to sample enough learners for the expected results to be able to reach statistical significance. Because in L2 studies meaningful correlations reported in journal articles have often been as low as 0.30 and 0.40, a good rule of thumb is that we need around 50 participants to make sure that these coefficients are significant and we do not lose potentially important results. However, certain multivariate statistical procedures require more than 50 participants; for factor analysis, for example, we need a minimum of 100 but preferably more subjects (p. 75).

It is on the basis of the two quotations that we tried to reach a sample of 50 teachers. It is, however important to mention that the number of the distributed questionnaires is more than 100.

III-4-3- Experimentation

An experimentation including a control group and an experimental group was carried out in 2018 to see the impact of Polya's (1957) model on the students' problem solving performance. Polya's model includes: (1) *Understand the problem*, (2) *Devise a plan*, (3) *Carry out the plan*, and (4) *Look back*.. The experimental group was being taught Polya's model for six weeks (from January, the 7th, 2018 till February the 22nd, 2018). The experimentation took place on April, the 4th, 2018 in two selected Secondary Schools in Naciria (Lycée Said Boukerou), Said Boukerou secondary school and Lycée Krim Belkacem (Krim Belkacem Secondary School) located in Boumerdes Province(Algeria). The control group was chosen from Said Boukerou secondary school, whereas the experimental group was taken from Krim Belkacem Secondary School. The students were asked to provide solutions to the following issue: Hatred can destroy societies. What should be done to fight it

in our society? The control group represents the students who did the task without being taught and explained Polya's model of problem solving. On the other hand, the experimental group includes the students to whom Polya's model of problem solving was taught and explained during six sessions. The control group represents the papers whose total number is 30. In the findings the papers of the control group are labeled with 0 indicating no application of the method. On the other hand, the experimental group includes a total number of 36 papers, and they are labeled with 0 indicating no application of the method.

On the basis of Polya's problem solving model, the following evaluation grid has been set:

- Problem understanding: The students are required to show their understanding of the problem by explaining it clearly (**5pts**)
- Devise a plan: The students are required to set a plan leading to solution generation (**5pts**)
- Carry out the plan: The students are required to display their solutions to the problem in an organised way (**5pts**)
- Look back: The students are required to reach coherence and relevance through their solutions (**5pts**)

III-4-4- The Checklist

To evaluate the assessment parts of New Prospects, a checklist has been developed. The Checklist includes Bloom's Taxonomy Levels: 'knowledge', 'comprehension', 'application', 'analysis', 'synthesis', and 'evaluation', as well as Quellmalz's Taxonomy stages: 'recall', 'analysis', 'comparison', 'inference', and 'evaluation.'

As it has been already been explained in the literature review the levels involving problem solving in the two taxonomies are: 'analysis', 'synthesis', 'inference', and 'evaluation.'

Table 7*A Checklist to Evaluate the Assessment Parts of the New Prospects*

The Levels of the Bloom's and Quellmalz's Taxonomies	YES	NO
1/ Knowledge/recall The textbook assessment activities stress 'knowledge'		
2/ Comprehension The textbook assessment activities stress 'comprehension'		
3/ Application The textbook assessment activities stress 'application'		
4/ Analysis The textbook assessment activities emphasise 'analysis'		
5/ Synthesis The textbook assessment activities emphasise 'synthesis'		
6/ Comparison The textbook assessment activities put stress on 'comparison'		
7/ Inference The textbook assessment activities stress 'inference'		
8/ Evaluation The textbook assessment activities stress 'evaluation'		

III-5- Data Analysis Procedures

To analyse the data of the present research, two procedures are used, namely qualitative content analysis, thematic analysis, descriptive statistics and inferential statistics using the statistical method SPSS. In addition, it should be mentioned that the interpretation of the results is to be done with reference to the theoretical framework and the review of the literature developed in the previous sections.

III-5-1- Descriptive Statistics and Inferential Statistics

Statistics are of two principle types: 'descriptive statistics' and 'inferential statistics'. The former helps to provide a summary of quantitative data. Such a type of statistics does not allow for generalizations of the findings. On the other hand, the key function of inferential

statistics is the testing of ‘statistical significance’. The latter indicates whether a specific finding in a sample is ‘true’ for the entire population and, hence, it allows for generalizability. Significance is measured by a probability coefficient (p), which can range from 0 to + I. In social sciences a finding is qualified as being of significance if $p < 0.05$; that the probability of the result is less than 5 percent (Dörnyei, 2007, pp. 209-210).

Descriptive statistics was used to describe the data gathered from the analysis of textbook new Prospects, the program, the BAC exams, as well as teacher’s views. It is calculated by finding the difference, mean, and average in data. For example, a sample of 25 teachers is the most motivated among the general sample of 300 teachers. The percentage of the most motivated teachers, then, is $25 \times 100 : 300 = 8.33\%$ (See Dörnyei, 2007)

III-5-2- T-Test

According to Richards and Schmidt (2010) T-test is “the test which used in testing and statistics is “a quantitative procedure for determining the *statistical significance* of the difference between the *means* on two sets of scores” (p. 613). In addition, Tavakoli (2012) explains that t-test also Student’s t-test is a parametric test which allows to figure out whether statistically significant differences exist between the means of two groups like in experimental and control groups . The researcher, by using the test, is provided with a t-value. The test helps determine whether the t-value is significant. Here is Student T test formula:

$$t = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{n}}}$$

Mean of the sample

Reference value

Standard deviation

Number of cases

[t-Test - Simply explained Retrived from https://datatab.net/tutorial/t-test](https://datatab.net/tutorial/t-test)

First, ‘the mean of the sample’ is obtained by assembling the total means then dividing the number by the number of the sample. For example, a sample of five students having: 12/20, 15/20, 9/20, 16/20, 10/20 has as a mean of the sample $12+15+9+16+10 \div 5 = 12.4$. The mean of the sample, then, is 12.4 out of twenty. Second, ‘a reference value’ relates to the standard value used for comparison. Third, ‘standard deviation’ represents the dispersion of dataset values in relation to the mean as, for example, the standard deviation of 1 2 3 4 5 is 1.414. Finally, ‘Number of cases’ indicates the number of students of the control and experimental groups involved in the experiment (Richards & Schmidt, 2010; Dörnyei, 2007).

III-5- 3- Qualitative Content Analysis and its Categories

In the current study, QCA is used together with the 3C3R Model by Hung (2006) to analyse the texts taken from the EFL program. In this vein, according to Mayring (2000) and Schreier (2012), “qualitative content analysis is a method for systematically describing the meaning of qualitative data” (as cited in Schreier, 2014, p. 170). To do so, the parts of the materials to be analysed should be assigned to “the categories of a coding frame”. The latter is “at the heart of the method, and it contains all those aspects that feature in the description and interpretation of the material” (Schreier, 2014, p. 170).

Moreover, Hsieh and Shannon (2005) define qualitative content analysis “as a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” (p. 1278). Another definition of qualitative content analysis is offered by Schreier (2012) who writes “QCA is a method for systematically describing the meaning of qualitative material. It is done by classifying material as instances of the categories of a coding frame” (p. 1). In this vein and about qualitative material, Mayring (2000) explains “The object of (qualitative) content analysis can be all sort of recorded communication (transcripts of interviews, discourses, protocols of observations, video tapes, documents ...).” (p. 20)

In the present study qualitative content analysis is used to analyse the contents of the EFL program designed for third-year secondary school classes. Its categories are the 3C3R components, namely 'content', 'context', 'connection', 'researching', 'reasoning', and 'reflecting'.

From the aforementioned definitions, it can be stated that qualitative content analysis is a research tool used to figure out the meaning of qualitative data such as texts, interviews, and questionnaires in a subjective way relying on a coding frame. In addition, QCA is principally based on research questions that determine the aspects of the materials to analyse. The steps in qualitative content analysis are shown in Table 8.

Table 8

Steps in QCA Adopted from Schreier (2012, p. 6)

-
- 1 Deciding on your research question
 - 2 Selecting your material
 - 3 Building a coding frame
 - 4 Dividing your material into units of coding
 - 5 Trying out your coding frame
 - 6 Evaluating and modifying your coding frame
 - 7 Main analysis
 - 8 Interpreting and presenting your findings
-

Central to qualitative content analysis is the coding frame. The latter includes "at least one main category and at least two subcategories." The main categories relate to the "aspects of the material about which the researcher would like more information, and subcategories specify what is said in the material with respect to these main categories" (Schreier, 2014, p. 174). The main categories of the coding frame are to be designed on the basis of three approaches as it will be illustrated in the following part dealing with the three approaches to qualitative content analysis.

Content analysis serves to interpret data contained in texts as, for example, in the case of answers that respondents give to open ended questions in questionnaires or interviews. In

addition, it is worth noting that “content analysis is an extremely broad area of research – its coverage includes both quantitative and qualitative approaches to analysis.” Moreover, researchers have used content analysis in various manners and in different contexts (Wilkinson & Birmingham, 2003, p. 68). Furthermore “content analysis can be used as a powerful research tool to determine, from the content of a message, sound inferences concerning the attitude of the speaker or writer” (North et al., 1963; as cited in Wilkinson & Birmingham, 2003, p. 68). Consequently, in this study content analysis will be used to interpret the data gathered from the corpus, as well as from the open-ended questions of the questionnaire and the interview conducted with teachers.

Thematic analysis is an approach used in analyzing qualitative data. Braun and Clarke (2006) suggest that thematic analysis should be considered as very important qualitative analysis method. They add saying that researchers should begin by learning thematic analysis as the first qualitative analysis method, because it allows them to grasp the key skills they may need when being involved in many other types of qualitative analysis.

Braun and Clarke (2006) write “Thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data. It minimally organizes and describes your data set in (rich) detail”(p. 78). According to Braun and Clarke (2006, p. 78), one of the core benefits of thematic analysis is its flexibility in that it is among the methods that independent “of theory and epistemology, and can be applied across a range of theoretical and epistemological approaches.” The authors add that thematic analysis is “compatible with both essentialist and constructionist paradigms within psychology”

Relying on Hung (2006) , the categories of the thematic analysis are the 3C3R components, representing ‘content’, ‘context’, ‘connection’, ‘researching’, ‘reasoning’, and ‘reflecting’.

Table 9

Phases of Thematic Analysis (Braun & Clarke , 2006, p. 87)

Phase	Description of the process
1. Familiarizing yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic ‘map’ of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis

In addition to the phases of thematic analysis, in Table 10 focus is on the definitions of the 6Rs for coding in thematic analysis.

The thematic analysis in the present study was used starting by selecting all the excerpts having relation with problem solving. Then, the passages were analysed in terms of the categories mentioned in the 3C3R model by Hung (2006). In other words, the experts are classified in terms of representing ‘content’, ‘context’, ‘connection’, ‘researching’, ‘reasoning’, and ‘reflecting’ as key categories and indicators of problem solving. The vocabulary relating to each component was stressed and taken into account.

Table 10

Definitions of the 6Rs for Coding in Thematic Analysis (Naeem et al. 2023, p. 10)

6Rs	Definitions
Robust	Robust coding refers to the representation of raw data in a meaningful and comprehensive manner, which encapsulates various aspects of the data under consideration
Reflective	Reflective coding involves creating codes, based on the keywords, which reflect a relationship between facts and theories and provide an interpretive lens for understanding the facts
Resplendent	Resplendent codes are rich and powerful, and provide a comprehensive explanation of the context under study; they effectively capture the essence of the data
Relevant	Relevant codes are inferential and descriptive, closely related to the research question, and are applied consistently to every piece of information with justified reasoning
Radical	Radical codes are unique and well defined, preventing overlaps, and might even offer insights that may contradict the main narrative of the analysis
Righteous	Righteous coding ensures codes logically fit within the larger coding and align with the research's purpose; they maintain consistency and understanding of the decisions made during coding

It is to be mentioned that in the present research thematic analysis has been used only in one case; that is, in the analysis of the findings obtained through question 5 (section two) of the questionnaire. The question is: Would you mention the benefits of problem-solving tasks implementation in classrooms?

III-5-4- SPSS

In the present study, SPSS and Microsoft Excel have been employed. About SPSS, Dörnyei (2007) clarifies "SPSS is not a beginners' software package, yet it is appropriate for people who have little experience in statistics and programming because of its user-friendly interactive feature. It has been around 35 years and the current version... is highly refined"

(p.198).In the current study, SPSS has been used for the analysis of all the quantitative data of the questionnaire with the exception of the results obtained through **question two** and **question four** in Section Three of the questionnaire. For the analysis of the findings obtained through the two questions, Microsoft Excel has been employed.

III-5-5- Microsoft Excel

About the program, Dörnyei (2003) writes: “there are various computer spreadsheet programs (such as Excel or Lotus 1-2-3) which allow for setting up rows and columns in an electronic form.” Some statistical procedures can be executed by the programs and the data used through them can generally be viewed or be transformed so that to be employed by other more advanced statistical programs (p. 103).

It is to be indicated that the computer spreadsheet program Excel has been used for the analysis of the following:

- a-**The findings obtained through the analysis of the textbook *New Prospects*.
- b-** The data gathered through the analysis of the tests implemented in the teacher’ book.
- c.** The data obtained through the analysis of the EFL BAC Exams (Subject Two, Stream Literature and Foreign Languages) designed from 2010 to 2024.

Conclusion

The current chapter has presented and discussed the research methodology. It has explained the methods of data collection and analysis combining quantitative and qualitative methods. In more precise terms, the textbook *New Prospects*, and the teachers’ questionnaire have been described, and the rationale behind the use of mixed methods research has been provided. In addition, the chapter has argued for the importance of triangulation in research. Besides, justifications have been provided for the inclusion of the theories discussed in the literature review in terms of methodological issues. Said simply, research should be theory-driven.

Chapter Four: Problem Solving in New Prospects and in the Algerian Third-Year Secondary School EFL Program: An Evaluation

Introduction

When effective instruction takes place, many interpretations can be suggested to help understand the main reasons for that. The reasons can typically be tied to good education system, competent teachers, favorable classroom environment, appropriate teaching methods, competent administration staff, motivated students, and effective teaching materials. These are the crucial factors for the students' academic success.

The use of EFL materials is meant to facilitate the task for both teachers and students, by providing them with what makes the teaching/learning process effective. It is, however, important to note that not all EFL materials have the potentiality of rendering the teachers and students' tasks easier; that is, what counts is to make sure that the materials being used are effective. The effectiveness of materials can be found out by evaluating them.

The first part of the chapter is concerned with the evaluation of the textbook *New Prospects*, designed by the Algerian Ministry of Education for teaching English in the Third-Year Secondary School Classes. In more precise terms, the evaluation aims to figure out whether the assessment parts of the textbook stress problem solving or not. The corpus of the study includes six learning logs included in *New Prospects* and one-model test in *the teacher's book*. The results are obtained by using a checklist (**See Appendix I**). To analyze the data, Bloom's (1956) Taxonomy and Quellmalz's Taxonomy (1987), the 3C3R Model by Hung (2006), qualitative content analysis, as well as Microsoft Excel are adopted.

It is to be indicated that the present chapter seeks to provide an answer to the research question set previously in the General Introduction and which is: Do the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in The Algerian Secondary School cater for problem solving in a satisfactory way? In addition, the chapter

attempts to confirm or refute the hypothesis: Yes, the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in The Algerian Secondary School cater for problem solving in a satisfactory way.

The second part of the chapter is an evaluation of the English program designed for third-year classes in the Algerian Secondary Schools. Such evaluation is of paramount importance, and it deserves high consideration since the program, if it is designed effectively, can support teachers to get insights into the principles that might promote their practices and their students' achievements.

This chapter addresses the content analysis of the program and follows a descriptive analysis to evaluate the program with relation to problem solving. The chapter, therefore, is a qualitative research that looks at the way problem solving is implemented in the program drawing on a checklist. The focus in this chapter is on the presentation of the findings obtained through the analysis of the selected parts of the program with relation to problem solving. The analysis is done relying on a model that is called 3C3R. The model encompasses two sets of components. One refers to 'core components' including: 'content', 'context', and 'connection'. The other relates to 'processing components' involving: 'researching', 'reasoning', and 'reflecting' (Hung, 2006, p. 55).

IV-1- Results and Discussion

Table 11 shows the detailed results about the items and percentages relating to each level in Bloom's Taxonomy and Quellmalz's Taxonomy, as well as the percentages of problem solving involved in the items of each log.

Percentage formula= (Value/Total value) x 100

We divided the value by the total value and then multiplied the resultant by 100.

(To understand the traceability of the results see Appendix One)

IV-1-1- Results of the Evaluation of the Learning Logs

Table 11 displays the final findings of the analysis of the learning logs of the textbook *New Prospects*.

Table 11

The Final Results of the Analysis of the Learning Logs of New Prospects

The Learning Logs	The number of items and percentages relating to each level in Bloom's Taxonomy and Quellmalz' Taxonomy	The percentages of problem solving in the items of each log		
		Problem solving	No problem solving	
Learning log one Page: 43	-Knowledge	12 items (85.71%)		
	-Comprehension	00 item (00%)		
	-Application	00 item (00%)		
	-Analysis	00 item (00%)	14.29%	85.71%
	-Synthesis	2 items (14.29)		
	-Comparison	00 item (00%)		
	-Inference	00 item (00%)		
	- Evaluation	00 item (00%)		
	Total Items			
	14 (100%)			
Learning log two Page: 72	-Knowledge	12 items (100%)		
	-Comprehension	00 item (00%)		
	-Application	00 item (00%)		
	-Analysis	00 item (00%)	00%	100%
	-Synthesis	00 item (00%)		
	-Comparison	00 item (00%)		
	-Inference	00 item (00%)		
	-Evaluation	00 item (00%)		
	Total Items			
	12 (100%)			

Learning three Page: 104	log	-Knowledge	10 items	(83.33 %)		
		-Comprehension	00 item	(00%)		
		-Application	00 item	(00%)		
		-Analysis	00 item	(00%)	16.66%	83.33%
		-Synthesis	1 item	(8.33%)		
		-Comparison	1 item	(8.33%)		
		-Inference	00 item	(00%)		
		-Evaluation	00 item	(00%)		
Total Items			12	(100)		
Learning four Page: 133	log	-Knowledge	12 items	(100%)		
		-Comprehension	00 item	(00%)		
		-Application	00 item	(00%)		
		-Analysis	00 item	(00%)	00%	100%
		-Synthesis	00 item	(00%)		
		-Comparison	00 item	(00%)		
		-Inference	00 item	(00%)		
		-Evaluation	00 item	(00%)		
Total Items			12	(100%)		
Learning five Page: 163	log	-Knowledge	9 items	(81.82%)		
		-Comprehension	00 item	(00%)		
		-Application	00 items	(00%)		
		-Analysis	00 item	(00%)	18.18%	81.82%
		-Synthesis	00 item	(00%)		
		-Comparison	2 items	(18.18%)		
		-Inference	00 item	(00%)		
		-Evaluation	00 item	(00%)		
Total Items			11	(100%)		
Learning six Page: 194	log	-Knowledge	15 items	(93.75%)		
		-Comprehension	00 item	(00%)		
		-Application	00 item	(00%)		
		-Analysis	00 item	(00%)	6.25%	93.75%
		-Synthesis	1 item	(6.25%)		
		-Comparison	00 item	(00%)		
		-Inference	00 item	(00%)		

-Evaluation	00 item (00%)
	Total Items
	16 (100%)

Table 11 shows that the analysed textbook includes six learning logs. The total number of the assessment items included in the first learning log is 13, of which only 2 (14.29%) involve problem solving. The second learning log includes 12 items of which 0 (00.00%) deal with problem solving. As regards learning log three, it assembles 12 testing items of which two (16.66%) turn around problem solving. As to the fourth learning log, it incorporates 12 testing items of which none (00.00%) targets problem solving. Learning log five has 11 testing items of which 2 (18.18%) target problem solving. Finally, the sixth learning log includes 16 testing items of which only one (6.25%) assess problem solving.

Figure 6 shows the percentage of problem solving involved in the six leaning logs, as well as the percentage of the items which do not involve problem solving.

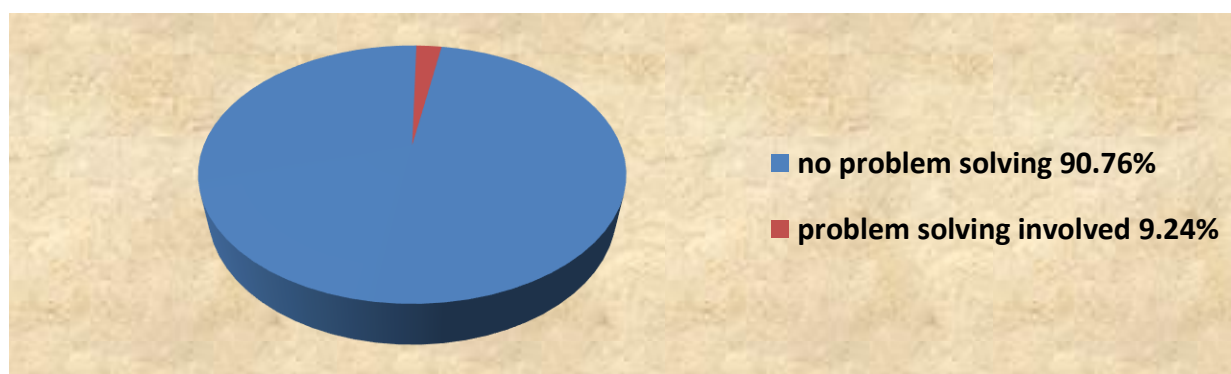


Figure 6. Problem Solving in the Learning Logs of New Prospects

Figure 6 indicates that 90.76% of the items of the learning logs of New Prospects do not deal with problem solving. On the other hand, 9.24% of the items of the learning logs of the textbook turn around problem solving.

The following are illustrations from New Prospects:

Unit Two: Ill-Gotten Gains Never Prosper

The Language items mentioned in learning log 2 I can...	The corresponding levels of the items in Bloom's taxonomy and Edys Quellmalz' framework
A use the present continuous passive in descriptions.	Knowledge of grammar
B give advice to someone using modals ought to/should, had better or their negatives.	Knowledge of grammar
C express obligation and prohibition using must or its negative form.	Knowledge of grammar
D express result using so+ adjective+ that and such+ adjective+ noun+ that.	Knowledge of grammar
E express cause and effect using because, for, as, since, as a result, consequently, etc.	Knowledge of grammar
F express hypothesis/condition using provided/providing that, as long as.	Knowledge of grammar
G ask for and give opinion.	Knowledge of language forms

(New Prospects, p.72)

One can see that all the examples turn around language forms requiring students to practice grammar items. Therefore, the students' higher-order thinking skills are not stressed in that the items just require the students to delve into the recall level of Bloom's taxonomy. Though grammar is of great importance, it should not be the unique aspect to which the students are frequently exposed. Shaped differently, the students need to go beyond the "recall" stage to develop their language and thinking skills that allow them to solve new and complex problems. More importantly, the final aim of education is to prepare competent students able to handle real-life issues successfully and intelligently. This can be reached by stressing students' motivation (Williams and Burden, 1997) and effective teaching and assessment practices (Wiggins, 1993, Quellmalz, 1987).

In addition to, illustrations from the textbook New Prospects that mention that problem solving is not stressed in it are the following:

Unit Four: Safety First

The Language items mentioned in learning log 4 I can...	The corresponding levels of the items in Bloom's taxonomy and Edys Quellmalz' framework
A use the gerund and the present simple.	Knowledge of grammar
B express cause and effect using because of, due to, owing to, as, since, etc.	Knowledge of grammar
C express cause and effect using as a result, consequently, as a consequence, as a result of, etc.	Knowledge of grammar
D express possibility using modals may/may not or its equivalent expressions likely that/possible that.	Knowledge of grammar
E use might/could/might not to speak about remote possibility.	Knowledge of grammar

(New Prospects, p.133)

It is clear from the examples that the students are not encouraged to solve problems that involve the higher-cognitive skills from Bloom's and Quellmalz's taxonomies. Rather, the students are just required to tackle grammar items corresponding to the 'recall' level.

IV-1-2- Results of the Second Assessment Part 'Skills and Strategies Assessment'

As it has already been mentioned in the methodological chapter in order to get the results of the second assessment part '**skills and strategies assessment**' of *New Prospects* reference should be made to the teacher's book where the tests are included. Accordingly, the findings displayed in Table 12 are the results of the test of unit one and they are applicable to unit 2, 3, 4, and 6. As regards unit 5, the test designed for this unit is completely identical to that of unit 1. This suggests that the results of units 1, 2, 3, 4, 5, and 6 are the same.

Table 12*The Results of the Analysis of Tests Designed in the Teacher's Book*

The activities of the test	Description	The corresponding level in Bloom's taxonomy and Quellmalz's taxonomy	The percentage of problem solving involved in the activities	
			Problem solving is implemented	problem solving is not implemented
Activity One	Reading comprehension	Comprehension	00%	100%
ActivityTwo	Find referents of words in the text	Knowledge of grammar	00%	100%
ActivityThree	Find expressions equivalent in meaning	Knowledge of vocabulary	00%	100%
Activity Four	Use of English	Knowledge of grammar and vocabulary	00%	100%
Activity five	Essay writing	analysis, Synthesis comparison, inference, and evaluation	100%	00%

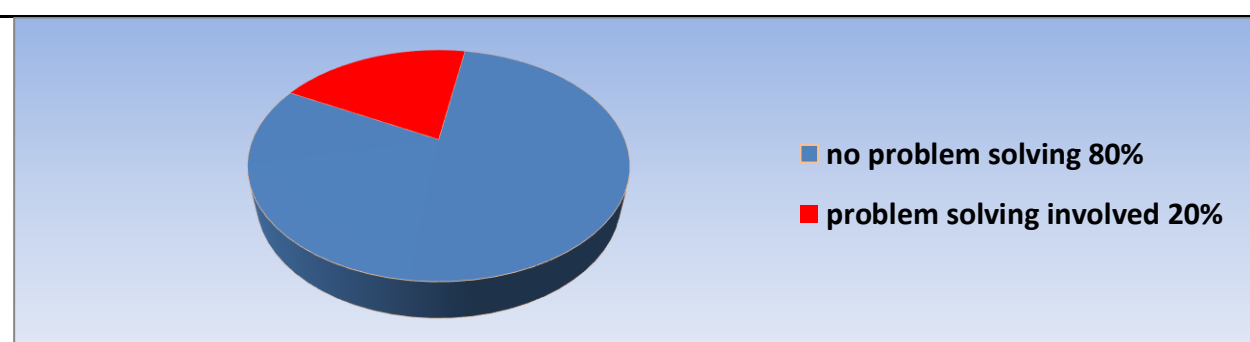
**Figure7. Problem Solving in the Tests Designed in the Teacher's Book**

Figure 7 suggests that 80% of the activities of the tests designed in the Teacher's Book do not involve problem solving, while 20% of the activities do.

IV-1-3- Discussion of the Findings

The results show that the first learning log of the textbook includes 13 assessment items of which 11 (85.71) deal with the cognitive level ‘knowledge’ and 2 items representing 14.29% are devoted to assessing ‘synthesis’. As regards the rest of the cognitive levels: ‘analysis’, ‘inference’, ‘comparison’, and ‘evaluation’, they are not included in the learning log in that no assessment items are devoted to such stages. As a result, the percentage of the items dealing with problem solving is only 14.29% and the rest which represent 85.71% deal with lower-order thinking skills. In light of this, one can see that problem solving in the first learning log is not stressed. The majority of the items do not help students develop an awareness of what triggers their creative mind. The results corroborate the findings reached in a study that aimed at the analysis of the integration of the 21st century skills in the Indonesian EFL textbook used by grade 7 students. Indeed, in the study Rinesko (2021) found that of the 705 tasks only 300 that promote 21st century skills lie problem solving and critical thinking.

The second learning log includes 12 assessment items. The findings indicate that all the items (100%) target the ‘knowledge’ level of Bloom’s Taxonomy. In this case, problem solving represents 00%, that is, the students are in all cases required to deal only with routine problems. Indeed, the items do not stimulate the students’ cognitive faculties to create solutions to new problems. At this stage, Schunk (2012) asserts that solving problems “does not take place when students’ skills become so well established that they automatically execute actions to attain goals” (pp. 299-300).

As regards the third learning log, it includes 12 items of which 10 (83.33%) turn around ‘knowledge’, 1 item (8.33%) deals with ‘synthesis’, and another 1 (8.33%) with ‘comparison’ as a cognitive stage in Quellmalz’s Taxonomy. Thus, the percentage of the activities devoted to assess the students’ abilities to solve problems dealing with higher-cognitive skills is only 16.66% and the rest deal with simple and mechanical drills.

Accordingly, like the first and the second learning logs the third does not provide the students with opportunities to reflect, analyse, criticise, guess, and evaluate implying that the students' intelligence is not fostered.

The fourth assessment learning log includes 12 items. All these items deal with one cognitive stage which is 'knowledge' and the other stages, namely 'comprehension', 'application', 'analysis', 'synthesis', 'comparison', 'inference', and 'evaluation' have been neglected. Such a learning log can impact students' views of instruction as being only what is easy and mechanical. Put it plainly, the students' awareness of the importance of problem solving is not raised. This clearly mirrors the traditional methods of testing whose focus was on discrete items and mechanical drills. Such a kind of testing does not promote creative knowledge construction. In this respect, Brookhart (2010) claims that "problems that require higher-order thinking are nonroutine problems" (p.100). This suggests that language is not a matter of isolated items. Rather, it is a complex system that is used to express meanings which are in most situations unpredictable and involve the use of diverse skills.

As to the fifth learning log, it includes 11 items of which 9 (81.82%) deal with 'knowledge' and 2 (18.18%) with 'comparison'. This suggests that the number of the items which require the students to deal with problem solving is only 2 (18.18%) and these are the items turning around the cognitive level 'comparison'. The most remarkable disadvantage of this is that the items do not allow the students to get in touch with critical reasoning and all that help them reach intellectual maturity and become independent learners.

Finally, the sixth learning log of *New Prospects* has 16 assessment items of which 15 (93.75%) target the cognitive level 'knowledge', and 1 (6.25%) item is linked to 'synthesis'. This means that, like the previous learning logs the sixth has only the percentage of 6.25 % of its items which relate to problem solving permitting the students to do tasks beyond

declarative knowledge. This requires raising awareness about the importance of problem solving as Trilling and Fadel (2009) write that 21st century skills include problem solving.

Having said that, it seems worthwhile to draw attention to the fact that 90.76% of the assessment items implemented in the learning logs do not target problem solving and only 9.24% of them involve problem solving. Such findings are different from what Kul (2024) found that Turkish EFL textbook includes to a great extent 21st century skills mainly critical thinking and problem solving activities. Hence, the importance accorded to problem solving in assessment sections of the coursebook is marginal compared to that accorded to routine items or lower-order-thinking skills. The mostly stressed type of assessment is about the 'knowledge' level. In this regard, Jonassen (2011) warns that "single forms of assessment betray the richness and complexity of problem solving" (p. 354). As a solution to that reference is to be made to Lohman and Finkelstein (2000) who contend that frequent exposure to problem-based learning would enhance students' problem solving skills.

The basic idea underlying the results obtained is that the textbook designers gave more importance to the traditional assessment than to the alternative one. Shaped another way, the assessment items do not reflect the principles of the teaching approaches as, for instance, Communicative Language Teaching (CLT), Competency Based Language Teaching (CBLT) and constructivism which aim at providing students with skills that permit them to become effective problem solvers. An obvious drawback of this situation is the difficulties that the students are going to face in solving problem through language when they meet unpredictable situations; because, the assessment items do not permit them to reason and to think intelligently and creatively to produce their own solutions to problems that they are likely to face in their daily lives. In this context, Pickford and Brown (2006) contend that "if we focus the tasks we set them on recall and memorization, that's what they'll do! If, however, we

want them take a deep rather than a surface approach to the development of practical skills, we need to design practical assignments intelligently” (p.1).

Drawing on the literature on problem solving, it is to be mentioned that any activity whose path to the solution is straightforward does not involve problem solving (e.g. see Vera Ella Woloshyn, 2009). This principle does not figure in most of the items of the learning logs. For example, in the learning log number 1, we have 12 items dealing with “knowledge”, and 2 with “synthesis”. By way of illustration, we mention the following items:

H. use adjectives and verbs with dependent prepositions.

*I. use the comparatives and the superlatives of quantifiers: **much, little, many, few.***

*J. make compound adjectives with **well+ past participle.***

*K. spell words correctly when I add to them such endings as **–ed, –ing, –s and –er.***

*L. pronounce the **–ed** ending correctly.*

*M. pronounce the past forms of the auxiliary **be**(New Prospects, 2007, p. 43).*

As it appears, all these items which are in the first learning log relate to the cognitive level “knowledge”. To be more explicit, the items **H, I, and J** involve knowledge of grammar or language forms. Likewise, the items **K, L and M**, deal with knowledge of phonetics or pronunciation. And as regards the last two items they deal with the cognitive level “synthesis” and which are: **D. talk about the past achievements of ancient civilizations, and G. narrate a very short episode in the life of a legendary figure using the past simple, the past perfect and appropriate conjunctions of time** (New Prospects, 2007, p. 43).

The cognitive levels ‘analysis’, ‘comparison’, ‘inference’, and ‘evaluation’, a pivotal concern within the teaching of problem solving, have all been neglected in the first log; no items dealing with these stages. An important thing to be kept in mind in interpreting this situation is that although there is much to be learned in language forms, assessing students in this way is not sufficient. This is because the main sources of thought, reasoning, creativity,

and intelligence have not been emphasised. In brief, the students' abilities in solving problems could fruitfully be expanded only if they are involved in deep understanding and exposed to produce solutions to new problems by bridging the gap between the initial state and the goal state; this bridge that they must build themselves by generating a range of alternatives and then making decisions about the most likely leading to effective solutions.

Similarly, in the second, the third, the fourth, the fifth, and the sixth learning logs of the textbook, focus is on the assessment items which do not involve problem solving. As evidence, in the second learning log all the items target 'knowledge'. In the third learning log, 10 items relate to 'knowledge' whereas 'comparison' and 'synthesis' are represented only by 1 item for each. In the learning log number four, all the items deal with the 'knowledge level'. In the learning log number five, the cognitive level 'knowledge' has been represented by 9 items while the cognitive level 'comparison' has only been represented by 2 items. At the end, the sixth learning log of the textbook has 16 items of which 15 call on the students to refer to 'recall', and 1 item requires them to deal with 'synthesis'. In this context, Jonassen (2011) clarifies that "if we teach students to solve problems but assess only their ability to recall what they have memorized for a test, then students will not invest mental effort in learning to solve problems" (p.354). This is an explicit call for stressing deep learning.

It is worth indicating that the second assessment part entitled "skills and strategies assessment" is designed in terms of a test the teacher assigns to students. The test is included in the Teacher's Book and it has five activities. The analysis of the test indicates that four (80%) of its activities deal with comprehension, knowledge of grammar and vocabulary, and only one activity (20%) fosters problem solving. These findings are in line with Boukersoul and Sadoune's results. The authors evaluated *My Book of English Year Four* in terms of twenty first century skills, and they found that of the textbook tasks only (11%) foster critical

thinking and critical thinking and problem solving. The first activity, for instance, deals with comprehension.

1. Read the text carefully and answer with True or False. Correct the false statements.

(2.5 points)

- a) The Aghlabids ruled the Maghrib in eighth century.
- b) Mahdiyya was a rival caliphate to Baghdad in the ninth century.
- c) The Berber dynasty built the Great Mosque of Tlemcen.
- d) The Almohad encouraged the development of science.
- e) The rise of western civilizations followed the fall of the Maghribian ones (Teacher's Book, 2007, p. 40).

The students in this case are asked to refer to the text to answer the questions. The solution in this case is to be found by exploiting the information provided in the text. The students do not need to analyze or evaluate. The following is an illustration:

V. Write a twenty-line essay on either of the following topics (6pts)

- A) Read again the last paragraph of the text and comment upon the following excerpt: "Ibn Khaldun (...) saw population decline as one of the factors in the decline of a civilization".
- B) Write a letter to the World Heritage Committee of the United Nations requesting it to include one of the historical sites in your country in its official list. Emphasise the historical importance of the site.
- C) Write an opinion letter about the effects of globalism on the local cultures/civilizations in the world.
- D) Write a story involving some famous character (man, woman, child) in your local folk culture or in world culture (Teacher's book, 2007, p. 42).

At this stage the students are required to write an essay on a given topic. This is an open-ended question. The students are provided with an opportunity to guess and give more than one right answer. Such activity is beneficial in that it allows the students to generate creative solutions. In this context, it is to be indicated that only 6 pts are devoted to the activity. This is not an important number. Accordingly, both teachers and students can be negatively affected by this way of testing. In clearer terms, the teachers and the students alike are likely going to stress the activities relating to language structures and give less importance to those turning around reasoning strategies and creative thinking. From this perspective, it can be stated the negative washback of the text becomes very noticeable.

In a nutshell, a very important point that the discussion has identified and which requires consideration and improvement is that mechanical drills have been remarkably generalized through the learning logs. The idea is that students will always remain within the scope of imitation, repetition, recall, and all in all within the scope of declarative knowledge rather than within that of procedural knowledge. This will support more knowledge 'reproduction' than 'production'

The following are the main conclusions to be drawn from our analysis of *New Prospects* learning logs with regard to problem solving:

1/ The results we obtained refute the hypothesis stating that Yes, the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in The Algerian Secondary School cater for problem solving in a satisfactory way.

2/ Almost all of the assessment items implemented in the learning logs require only obvious solutions. That is, there is no stress of items necessitating creative solutions tapping into the students' creative mind. As regards the second assessment part entitled 'skills and strategies assessment' included in the teacher's book, the majority of the activities do not deal with higher-cognitive skills except in the essay writing.

3/As the assessment items and activities are not complex; poor problem solvers or low-achieving students can manage to solve them.

4/The two assessment parts noticeably mirror rote learning which is ineffective; because, it cannot be a good means in handling everyday-life problems. Shaped differently, language items which do not emphasise critical reasoning cannot prepare students to successfully and effectively perform in real-life situations whose complexity and unpredictability are crucial tenets.

5/ There is no consideration of the activities that require students to produce and generate genuine solutions.

6/ The items, almost in their totality, do not reflect the principles of life-long learning whose elements such as problem solving, creativity, reasoning, decision making, and critical thinking are foundational.

7/The findings reveal that nearly all of the items exhibit the levels of lower order-thinking skills. In particular, for most of the items, the corresponding stage is ‘knowledge’, or ‘recall’. In other words, the higher-order thinking skills involving problem solving, such as ‘analysis’ ‘synthesis’ ‘inference’, ‘comparison’, and ‘evaluation’ have not been stressed.

8/ The assessment parts of the textbook are in most cases not problems in the sense that a problem exists.

9/The assessment parts reflect the traditional ways of teaching and assessment whose focus is on language structures.

IV-2-The Evaluation of the Algerian Third Year SS EFL Program in terms of Problem Solving

The following section is devoted to the presentation of the findings obtained from the evaluation of the EFL curriculum designed for classes preparing for their BAC examinations.

III-2-1-Results of the Algerian Third Year SS EFL Program in terms of Problem Solving

The findings have been obtained using qualitative content analysis and the 3C3R model. To reach clarity, tables have been used for the presentation of the findings.

Table 13

Category One: The Content Component in the Program

Examples about content (Illustrative passages from the program)	Coding Rules	Lacks about the Content Component
<p>1▶ (The more English is mastered, the better the students' success and development in an academic, scientific, and professional environment increasingly requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations.)(P. 3)</p> <p>2▶ (The methodological/technological objectives are set to: -consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities.)(P. 4)</p> <p>3▶ (the pedagogy of integration is adopted to ensure that learning is becoming more and more effective and that the acquired knowledge is being used to solve new ongoing problematic situations) . (P. 6)</p> <p>4▶ (A learning situation (corresponding to Project Outcomes) is an exploratory situation which: - Promotes the acquisition of new knowledge in terms of 'savoir', savoir-faire', and 'savoir-être' meaning respectively in English: know-what, know-how-to-do, and know-how-to-be. -It is to be solved collectively (in groups).(P. 6)</p> <p>5▶ (An integration situation (corresponding to Learners' Outcomes) is a reinvestment situation that: -Allows the students to solve a problem individually -Leads to the integration of know-what and know-how, which all have been discussed in the classroom).(P. 6)</p>	<p>1/ The passage joins together the mastery of EFL by students and their capacity to solve complex problems in varied situations. This should be fostered through the to-be-learned content.</p> <p>2/ The excerpt is about the higher-order thinking skills: 'analysis', 'synthesis', and 'evaluation' that the students should develop through the content of relevant activities.</p> <p>3/ The passage pinpoints to the students' task to connect their acquired knowledge to the resolution of problems in ongoing problematic situations.</p> <p>4/ The passage shows that The Project Outcomes foster the acquisition of new knowledge and resolution of problems collectively. A content about know-what, know-how-to-do, and know-how-to-be should be stressed.</p> <p>5/ It is shown in the passage that an integration situation (corresponding to Learners' Outcomes) allows the students to solve a problem individually, which becomes possible through content about know-what and know-how.</p>	<p>The main lack to be indicated regarding the 'content' component is that stress is put on the 'complexity' criterion, and the 'ill-structuredness' criterion has been neglected.</p>

6► (Both learning and integration situations are meant to foster the students' initiative and creativity). (P. 7)

7► (Competency 1: Interact orally

This competence is meant to allow the students to interact, that is, to negotiate, to persuade, to give their opinions, to take and give the floor and this during brainstorming or when debating and solving problems collectively).(P. 7)

8► (*Des situations d'apprentissage* (Project Outcomes) et *des situations d'intégration* (Learners' Outcomes):

These situations are problem situations that can be resolved through production activities that are more or less complex). (P. 8)

9► Structure of the projects and samples of activities

Pupils will: (Project Two)

(a)collect data/ organise data/evaluate data(Skills and strategy Outcomes), and (b)be involved in critical thinking/evaluate/judge(Skills and strategy Outcomes) (P. 15)

Pupils will: (Project Three)

(a)take notes/compare/synthesise/ draw conclusions/evaluate(Skills and strategy Outcomes), and (b) use critical judgment(Skills and strategy Outcomes) (P. 16)

Pupils will: (Project Four)

(a) be involved in a panel discussion(Project outcomes), (b) discuss issues related to the effects of advertising on people (Learners' outcomes), (c) analyse/ synthesise/ evaluate information (Skills and strategy Outcomes), and (d) compare/ use critical judgment (Skills and strategy Outcomes) (P. 17)

Pupils will: (Project Five)

“make inferences/ predict/ draw conclusions/ use logic/ critical thinking(Skills and strategy Outcomes)” (P. 18)

6/ The passage shows that both learning and integration situations are meant to foster the students' initiative and creativity, which become possible through content stressing problem solving.

7/ It is indicated in the excerpt that Competency 1: Interact orally allows the students to debate and solve problems collectively. Content about problem solving is necessary.

8/ The excerpt is about the learning situations (Project Outcomes) and (Learners' Outcomes) that can be resolved through production activities that are more or less complex. The problems solving tasks deal with a content that stresses complexity.

9/ Structure of the projects and samples of activities

•In project two students will have a class debate on the importance of ethics in business (Project outcomes), and will collect data/ organise data/evaluate data and get involved in critical thinking/evaluate/judge.

Ill-structuredness and complexity should be stressed. .

•In project three students will write reports comparing different systems in the world, discuss, take notes/compare/ synthesise/ draw conclusions/evaluate, and use critical judgment. Ill-structuredness and complexity should be stressed. .

•In project four students will

Discuss, analyse/ synthesise/ evaluate information, compare/ use critical judgment. Ill-structuredness and complexity should be stressed. .

•In project five students will make inferences/ predict/ draw conclusions/ use logic/ critical thinking. Ill-structuredness and complexity should be stressed. .

<p>Pupils will: (Project Six) “(a) compare/ make inferences/ draw conclusions/ convince(Skills and strategy Outcomes), and (b) demonstrate critical thinking and judgment(Skills and strategy Outcomes)” (P. 20)</p>	<p>•In project six students will discuss, make inferences/ draw conclusions/ convince, demonstrate critical thinking and judgment. Ill-structuredness and complexity of the tasks becomes necessary.</p>
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Table 13 suggests that the main lack to be indicated regarding the ‘content’ component is that stress is put on the ‘complexity’ criterion, and the ‘ill-structuredness’ criterion has been neglected.

Table 14

Category Two: The Context Component in the Program

Examples about context (Illustrative passages from the program)	Coding Rules	Lacks about the Context Component
<p>1▶ (The teaching of English involves not only the acquisition of language and communication skills, but also... the development of critical thinking, analysis....)(P. 3)</p>	<p>1/ The passage indicates that the teaching of English involves not only language and communication skills, but also... the development of critical thinking, analysis.... . This can take place only in a context that favors complex-problem solving.</p>	<p>In the program the three elements that are linked to the ‘context’ component: ‘contextual validity’, ‘degree of contextualization’, and ‘students’ motivation’ have not been specified.</p>
<p>2▶ (The more English is mastered the better the students’ success and development in an academic, scientific, and professional environment increasingly demanding and requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations.)(P. 3)</p>	<p>2/ The passage ties EFL mastery with the students’ abilities to solve increasingly complex problems in various and varied situations.</p>	
<p>3▶ (The methodological/technological objectives are set to</p>	<p>3/ The methodological/technological objectives are set to</p>	

-
- Consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities,
 - Encourage reflexion at all the levels of learning.)(P. 4)

4► (The pedagogy of integration is adopted to ensure that learning is becoming more and more effective and that the acquired knowledge is being used to solve new ongoing problematic situations.) (P. 6)

5► (From one year to another, from one cycle to another, the acquired knowledge is gradually reinvested and put at the service of increasingly complex skills.) (P. 6)

6► (A learning situation (corresponding to Project Outcomes) is an exploratory situation which:

- Promotes the acquisition of new knowledge in terms know-what, know-how-to-do, and know-how-to-be.

-It is to be solved collectively (in groups)

It is to be reinvested in school contexts or outside classrooms contexts.) (P. 6)

7► (An integration situation (corresponding to Learners' Outcomes) is a reinvestment situation that:

- Allows to solve a problem individually
- Leads to the integration of know-what and know-how, which all have been discussed in the classroom.)(P. 6)

8► (Both learning and integration situations are meant to foster the students' initiative and creativity.)(P. 7)

9► (Competency 1: Interact orally

This competence is meant to allow the students to interact, that is, to negotiate, to persuade, to give their opinions, to take and give the floor and this during brainstorming or when debating and solving problems

consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities, as well as encourage reflexion at all the levels of learning. The context is embodied in the relevant activities.

4/ The passage pinpoints to the students' task to connect their acquired knowledge to the resolution of problems in ongoing problematic situations.

5 / In this excerpt, the acquired knowledge is gradually reinvested so that to develop increasingly complex skills. This requires a motivating context.

6/ The passage is about project outcomes that are meant to foster students know-how-to do. This is to happen in school contexts and outside classrooms contexts.

7/ An integration situation (corresponding to Learners' Outcomes) is a reinvestment situation that fosters problem solving in relevant and motivating contexts.

8/ The passage shows that both learning and integration situations are meant to foster the students' initiative and creativity, which become possible through the connection of background knowledge to the new one.

9/ The excerpt shows that Competency 1: Interact orally allows the students to debate and solve problems collectively. This requires a motivating context.

collectively.)(P. 7)

10► (Des situations d'apprentissage (Project Outcomes) et des situations d'intégration (Learners' Outcomes):

These situations are problem situations that can be resolved through production activities that are more or less complex.)(P. 8)

11► (ICTs must be used as means/tools of communication, documentation, discovery...)(P. 9)

12► (In short, this digital environment will allow the students to articulate their know-what and know-how for a more efficient and effective presentation of their projects.)(P. 10)

13► Structure of the projects and samples of activities

Pupils will: (Project Two)

(a)collect data/ organise data/evaluate data(Skills and strategy Outcomes), and (b)be involved in critical thinking/evaluate/judge(Skills and strategy Outcomes) (P. 15)

Pupils will: (Project Three)

(a)take notes/compare/synthesise/ draw conclusions/evaluate(Skills and strategy Outcomes), and (b) use critical judgment(Skills and strategy Outcomes) (P. 16)

Pupils will: (Project Four)

(a) be involved in discussion s (Project outcomes), (b) discuss issues related to the effects of advertising on people (Learners' outcomes), (c) analyse/ synthesise/ evaluate information (Skills and strategy Outcomes), and (d) compare/ use critical judgment (Skills and strategy Outcomes) (P. 17)

10/ The passage qualifies the learning situations (Project Outcomes) and (Learners' Outcomes) that can be resolved through production activities that are more or less complex. At this stage a motivating context is required

11/ The passage shows that ICTs must be used as means/tools of communication, documentation, discovery. To do so, a motivating context should be stressed.

12/ The excerpt illustrates the importance of connecting and joining together the know-what and know-how by the students for a more efficient and effective presentation of their projects. To do so, a motivating context should be stressed.

13/ Structure of the projects and samples of activities

•In project two students will have a class debate on the importance of ethics in business (Project outcomes), and will collect data/ organise data/evaluate data and get involved in critical thinking/evaluate/judge. To do so, a motivating context should be stressed.

•In project three students will write reports comparing different systems in the world, discuss, take notes/compare/ synthesise/ draw conclusions/evaluate, and use critical judgment. To do so, a motivating context should be stressed.

<p>Pupils will: (Project Five) make inferences/ predict/ draw conclusions/ use logic/ critical thinking(Skills and strategy Outcomes) (P. 18)</p>	<p>●In project four students will Discussion, analyse/ synthesise/ evaluate information, compare/ use critical judgment. To do so, a motivating context should be stressed.</p>
<p>Pupils will: (Project Six) (a) compare/ make inferences/ draw conclusions/ convince(Skills and strategy Outcomes), and (b) demonstrate critical thinking and judgment(Skills and strategy Outcomes) (P. 20)</p>	<p>●In project five students will make inferences/ predict/ draw conclusions/ use logic/ critical thinking. To do so, a motivating context should be stressed. ●In project six students will discuss, make inferences/ draw conclusions/ convince, demonstrate critical thinking and judgment. To do so, a motivating context should be stressed.</p>

Table 14 suggests that in the program the three elements that are linked to the ‘context’ component: ‘contextual validity’, ‘degree of contextualization’, and ‘students’ motivation’ have not been specified.

Table 15

Category Three: The Connection Component in the Program

Examples about <u>connection</u> (Illustrative passages from the program)	Coding Rules	Lacks about the Connection Component
<p>1▶ (The teaching of English involves not only the acquisition of language and communication skills, but also...the development of critical thinking, analysis ...)(P. 3)</p>	<p>1/ The passage demonstrates the necessity of acquiring critical thinking and analysis by students as two skills that would allow them to connect their linguistic knowledge to problem-solving situations.</p>	
<p>2▶ (The more English is mastered by the students the better the students’ success and development in an academic, scientific, and professional environment increasingly demanding and requiring the</p>	<p>2/ The provided passage reflects the crucial role that the mastery of EFL plays in new complex problem solving situations to which students’ background knowledge should be effectively</p>	<p>There is no specification of the connections nature in the program.</p>

students to use their learning abilities to solve increasingly complex problems in various and varied situations.)(P. 3)

3 ► *(The methodological/technological objectives are set to:*
 -Consolidate the students' intellectual capacities such as analysis, synthesis, and evaluation through relevant activities.)(P.4)

4► (The pedagogy of integration is adopted to ensure that learning is becoming more and more effective and that the acquired knowledge is being used to solve new ongoing problematic situations .) (P. 6)

5► (This view of learning is to be held through learning situations (or exploratory situations) and situations of integration (or reinvestment situations), which are new for the students.)(P. 6)

6► (A learning situation (corresponding to Project Outcomes) is an exploratory situation which:

- Promotes the acquisition of new knowledge in terms of 'savoir', savoir-faire', and 'savoir-être' meaning respectively in English: know-what, know-how-to-do, and know-how-to-be.

-It is to be solved collectively (in groups.)(P. 6)

7► (An integration situation (corresponding to Learners' Outcomes) is a reinvestment situation that:

-Allow the students to solve a problem individually

-Leads to the integration of know-what and know-how, which all have been discussed in the classroom.) (P. 6)

8► (Both learning and integration situations are meant to foster the students' initiative and creativity.)(P. 7)

9► (Competency 1: Interact orally

This competence is meant to allow the students to interact, that is, to

connected.

3/ The higher-cognitive levels in Bloom's Taxonomy: 'analysis', 'synthesis', and 'evaluation' require the students to connect data to the solution generation in case of problematic situations.

4/ The passage pinpoints to the students' task to connect their acquired knowledge to the resolution of problems in ongoing problematic situations.

5/ The passage indicates that new exploratory and reinvestment situations are the field in which the pedagogy of integration is to be implemented. This becomes possible if old knowledge is tied and connected to the new one.

6/ The Project Outcomes favor the acquisition of new knowledge and resolution of problems collectively. A connection between know-what, know-how-to-do, and know-how-to-be should be made.

7/ An integration situation (corresponding to Learners' Outcomes) allows the students to solve a problem individually and to connect know-what and know-how, which all have been discussed in the classroom.

8/ The passage shows that both learning and integration situations are meant to foster the students' initiative and creativity, which become possible through the connection of background knowledge to the new one.

9/ The excerpt illustrates the students the Competency 1: Interact orally allows the students to debate and solve problems

negotiate, to persuade, to give their opinions, to take and give the floor and this during brainstorming or when debating and solving problems collectively.)(P. 7)

10► (*Des situations d'apprentissage* (Project Outcomes) et *des situations d'intégration* (Learners' Outcomes):

These situations are problem situations that can be resolved through production activities that are more or less complex.)(P. 8)

11► (In short, this digital environment will allow the students to articulate their know-what and know-how for a more efficient and effective presentation of their projects.)(P. 10)

12 ► Structure of the projects and samples of activities

Pupils will: (Project Two)

(a)collect data/ organise data/evaluate data(Skills and strategy Outcomes), and (b)be involved in critical thinking/evaluate/judge(Skills and strategy Outcomes) (P. 15)

Pupils will: (Project Three)

(a)take notes/compare/synthesise/ draw conclusions/evaluate(Skills and strategy Outcomes), and (b) use critical judgment(Skills and strategy Outcomes) (P. 16)

Pupils will: (Project Four)

(a) be involved in discussion(Project outcomes), (b) discuss issues related to the effects of advertising on people (Learners' outcomes), (c) analyse/ synthesise/ evaluate information (Skills and strategy Outcomes), and (d) compare/ use critical judgment (Skills and strategy Outcomes) (P. 17)

Pupils will: (Project Five)

make inferences/ predict/ draw conclusions/ use logic/ critical thinking(Skills and strategy Outcomes) (P. 18)

Pupils will: (Project Six)

(a) compare/ make inferences/ draw conclusions/ convince(Skills and strategy Outcomes), and (b) demonstrate critical thinking and judgment(Skills and strategy Outcomes) (P. 20)

collectively. A connection of the students' ideas becomes necessary.

10/ The passage qualifies the learning situations (Project Outcomes) and (Learners' Outcomes) that can be resolved through production activities that are more or less complex. At this stage there must be a connection between the students' old knowledge and their new one.

11/ The excerpt illustrates the importance of connecting and joining together the know-what and know-how by the students for a more efficient and effective presentation of their projects.

12/ Structure of the projects and samples of activities

●In project two students will have a class debate on the importance of ethics in business (Project outcomes), and will collect data/ organise data/evaluate data and get involved in critical thinking/evaluate/judge. To do so, a motivating context should be stressed.

●In project three students will write reports comparing different systems in the world, discuss, take notes/compare/ synthesise/ draw conclusions/evaluate, and use critical judgment. To do so, a motivating context should be stressed.

●In project four students will discuss, analyse/ synthesise/ evaluate information, compare/ use critical judgment. To do so, a motivating context should be stressed.

●In project five students will make inferences/ predict/ draw conclusions/ use logic/ critical thinking. To do so, a motivating context should be stressed.

●In project six students will discuss, make inferences/ draw conclusions/ convince, demonstrate critical thinking and judgment. To do so, a motivating context should be stressed.

Table 15 indicates that there is no specification of the connections nature in the program.

Table 16

Category Four: The Researching Component in the Program

Examples about researching (Illustrative passages from the program)	Coding Rules	Lacks about the Researching component
<p>1▶ (The teaching of English involves not only the acquisition of language and communication skills, but also the... development of critical thinking, analysis...)(P. 3)</p>	<p>1/ Critical thinking and analysis in EFL are both necessary for effective problem solving. The students are required to understand the problems and search for relevant data.</p>	
<p>2▶ (The more English is mastered the better the students' success and development in an academic, scientific, and professional environment increasingly demanding and requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations.)(P. 3)</p>	<p>2/ Students' mastery of EFL is best translated by their capacity to solve complex problems. Such capacity is foundationally based on problem understanding and search for relevant data.</p>	
<p>3▶ (The methodological/technological objectives are set to: -consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities. - Encourage reflexion at all the levels of learning.)(P. 4)</p>	<p>3/ The methodological/technological objectives are set to consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities. - Encourage reflexion at all the levels of learning. Such capacities are closely tied to researching as a key component in problem solving.</p>	<p>Lacks about the 'researching' component are to be highlighted. For example, 'goal specification' and 'context specification' are lacking in the program.</p>
<p>4 ▶(The pedagogy of integration offers a moment of discovery, observation, application, reformulation, and control.)(P. 5)</p>	<p>4/ Both 'discovery' and 'application' are cases of problem-solving. At this stage researching is essential.</p>	
<p>5▶ (In addition, the designers advocate that this pedagogy makes leaning more effective: The achievements are better fixed because the various types of knowledge are being used in the problem solving</p>	<p>5/ The pedagogy makes leaning more effective: The achievements are better fixed because the various types of knowledge are being used in the problem solving process in</p>	

process in constantly new learning situations.)(P. 5)

6▶ (From one year to another, from one cycle to another, the acquired knowledge is gradually reinvested and put at the service of increasingly complex skills.)(P.5)

7▶ (This view of learning is to be held through learning situations (or exploratory situations) and situations of integration (or reinvestment situations), which are new for the students.)(P.5)

8▶ (A learning situation (corresponding to Project Outcomes) is an exploratory situation which:

- Promotes the acquisition of new knowledge in terms of ‘savoir’, savoir-faire’, and ‘savoir-être’ meaning respectively in English: know-what, know-how-to-do, and know-how-to-be.

-It is to be solved collectively (in groups).)(P. 6)

9▶ (An integration situation (corresponding to Learners’ Outcomes) is a reinvestment situation that:

-Allow the students to solve a problem individually (P. 6)

10▶ (Both learning and integration situations are meant to foster the students’ initiative and creativity.)(P. 7)

11▶ (Doing projects collectively is meant to foster the students’ motivation and interest, allow the students to acquire effective work methods, as well as develop their responsibility and autonomy.)(P. 7)

12 ▶ (Competency 1: Interact orally

This competence is meant to allow the students to interact, that is, to negotiate, to persuade, to give their opinions, to take and give the floor and this during brainstorming or when debating and solving

constantly new learning situations. At this stage researching should be stressed.

6/ The acquired knowledge is gradually reinvested and put at the service of increasingly complex skills. At this stage researching should be stressed.

7/ Both learning situations (or exploratory situations) and situations of integration (or reinvestment situations), which are new for the students require researching as a key component of problem-solving.

8/ The passage shows that The Project Outcomes foster the acquisition of new knowledge and resolution of problems collectively. At this level researching should be stressed.

9/ It is shown in the passage that an integration situation (corresponding to Learners’ Outcomes) allows the students to solve a problem individually, which becomes possible through researching that is closely linked to know-how.

10/ The passage shows that both learning and integration situations are meant to foster the students’ initiative and creativity, which become possible through researching as a key component of problem-solving.

11/ Doing projects collectively is meant to foster the students’ motivation and interest, allow the students to acquire effective work methods, as well as develop their responsibility and autonomy.

12/ The excerpt illustrates the students the Competency 1: Interact orally allows the students to debate and solve problems collectively. Researching at this stage is crucial.

problems collectively.) (P. 7)

13 ► (*Des situations d'apprentissage* (Project Outcomes) et *des situations d'intégration* (Learners' Outcomes):

These situations are problem situations that can be resolved through production activities that are more or less complex.) (P. 8)

14► Structure of the projects and samples of activities

Pupils will: (Project Two)

(a) collect data/ organise data/ evaluate data (Skills and strategy Outcomes), and (b) be involved in critical thinking/ evaluate/ judge (Skills and strategy Outcomes) (P. 15)

Pupils will: (Project Three)

(a) take notes/ compare/ synthesise/ draw conclusions/ evaluate (Skills and strategy Outcomes), and (b) use critical judgment (Skills and strategy Outcomes) (P. 16)

Pupils will: (Project Four)

(a) analyse/ synthesise/ evaluate information (Skills and strategy Outcomes), and (b) compare/ use critical judgment (Skills and strategy Outcomes) (P. 17)

Pupils will: (Project Five)

“make inferences/ predict/ draw conclusions/ use logic/ critical thinking (Skills and strategy Outcomes)” (P. 18)

Pupils will: (Project Six)

“(a) compare/ make inferences/ draw conclusions/ convince (Skills and strategy Outcomes), and (b) demonstrate critical thinking and judgment (Skills and strategy Outcomes)” (P. 20)

13/ The excerpt illustrates the importance of connecting and joining together the know-what and know-how by the students for a more efficient and effective presentation of their projects. Researching at this stage is crucial.

14/ Structure of the projects and samples of activities

● In project two students will have a class debate on the importance of ethics in business (Project outcomes), and will collect data/ organise data/ evaluate data and get involved in critical thinking/ evaluate/ judge. To do so, a motivating context should be stressed.

● In project three students will write reports comparing different systems in the world, discuss, take notes/ compare/ synthesise/ draw conclusions/ evaluate, and use critical judgment. To do so, a motivating context should be stressed.

● In project four students will discuss, analyse/ synthesise/ evaluate information, compare/ use critical judgment. To do so, a motivating context should be stressed.

● In project five students will make inferences/ predict/ draw conclusions/ use logic/ critical thinking. To do so, a motivating context should be stressed.

● In project six students will discuss, make inferences/ draw conclusions/ convince, demonstrate critical thinking and judgment. To do so, a motivating context should be stressed.

In Table 16 lacks about the ‘researching’ component are to be highlighted. For example, ‘goal specification’ and ‘context specification’ are lacking in the program.

Table 17

Category Five: The Reasoning Component in the Program

Examples about Reasoning (Illustrative passages from the program)	Coding Rules	Lacks about the Reasoning Component
1/ ► (The teaching of English involves not only the acquisition of language and communication skills, but also... the development of critical thinking, analysis....)(P. 3)	1/ The passage indicates that the teaching of English involves not only the acquisition of language and communication skills, but also... the development of critical thinking, analysis. The two skills: critical thinking and analysis involve reasoning.	The analysis of the findings shows that ‘the testing of hypotheses and possible solutions’ is not incorporated into the program.
2/ ► (The more English is mastered by the students the better the students’ success and development in an academic, scientific, and professional environment increasingly demanding and requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations.)(P. 3)	2/ The passage ties EFL mastery with the students’ abilities to solve increasingly complex problems in various and varied situations. At this stage reasoning takes place through analysis and testing of hypotheses.	
3/ ► (The methodological/technological objectives are set to - Consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities, - Encourage reflexion at all the levels of learning.)(P. 4)	3/ The methodological/technological objectives are set to - Consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities, - Encourage reflexion at all the levels of learning. Reasoning is embodied in the relevant activities.	
4/ ► the pedagogy of integration is adopted to ensure that learning is becoming more and more effective and that the acquired knowledge is being used to solve new ongoing problematic situations . (P. 6)	4/ The passage pinpoints to the students’ task to connect their acquired knowledge to the resolution of problems in ongoing problematic situations.	
5/ ► From one year to another, from one cycle to another, the acquired knowledge is gradually reinvested and put at the service	5 / In this excerpt, the acquired knowledge is gradually reinvested and connected to increasingly complex skills.	

of increasingly complex skills.(P. 6)

6/ ►(This view of learning is to be held through learning situations (or exploratory situations) and situations of integration (or reinvestment situations), which are new for the students.) (P. 6)

7/ ► (A learning situation (corresponding to Project Outcomes) is an exploratory situation which:

- Promotes the acquisition of new knowledge in terms of ‘savoir’, savoir-faire’, and ‘savoir-être’ meaning respectively in English: know-what, know-how-to-do, and know-how-to-be.

-It is to be solved collectively (in groups)

- It is built for an educational purpose (for the class): it is experienced in classrooms to be reinvested in school contexts or outside classrooms contexts.)(P. 6)

8/ ►(An integration situation (corresponding to Learners’ Outcomes) is a reinvestment situation that:

- Allow the students to integrate their knowledge and see whether they are competent
- Allows to solve a problem individually
- Leads to the integration of know-what and know-how, which all have been discussed in the classroom.)(P. 6)

9/ ► (Both learning and integration situations are meant to foster the students’ initiative and creativity.)(P. 7)

10► (Competency 1: Interact orally

(This competence is meant to allow the students to interact, that is, to negotiate, to persuade, to give their opinions, to take and give the floor and this during brainstorming or when debating and solving problems collectively.)(P. 7)

Complex skills involve reasoning.

6/The passage indicates that new exploratory and reinvestment situations are the field in which the pedagogy of integration is to be implemented. This becomes if reasoning is stressed.

7/ The passage is about project outcomes that are meant to foster students know-how-to do. This is to happen in school contexts and outside classrooms contexts. Know-how to do like knowing how to solve problems is closely linked to analysis and reasoning.

8/ An integration situation (corresponding to Learners’ Outcomes) is a reinvestment situation that fosters problem solving stressing reasoning.

9/ The passage shows that both learning and integration situations are meant to foster the students’ initiative and creativity, which become possible by stressing reasoning.

10/ The excerpt illustrates the students the Competency 1: Interact orally allows the students to debate and solve problems collectively. To do so, reasoning becomes necessary.

11 ► *(Des situations d'apprentissage (Project Outcomes) et des situations d'intégration (Learners' Outcomes):*

These situations are problem situations that can be resolved through production activities that are more or less complex.) (P. 8)

12► Structure of the projects and samples of activities

Pupils will: (Project Two)

(a) collect data/ organise data/ evaluate data (Skills and strategy Outcomes), and (b) be involved in critical thinking/ evaluate/ judge (Skills and strategy Outcomes) (P. 15)

Pupils will: (Project Three)

(a) take notes/ compare/ synthesise/ draw conclusions/ evaluate (Skills and strategy Outcomes), and (b) use critical judgment (Skills and strategy Outcomes) (P. 16)

Pupils will: (Project Four)

(a) be involved in a panel discussion (Project outcomes), (b) discuss issues related to the effects of advertising on people (Learners' outcomes), (c) analyse/ synthesise/ evaluate information (Skills and strategy Outcomes), and (d) compare/ use critical judgment (Skills and strategy Outcomes) (P. 17)

Pupils will: (Project Five)

“make inferences/ predict/ draw conclusions/ use logic/ critical thinking (Skills and strategy Outcomes)” (P. 18)

Pupils will: (Project Six)

“(a) compare/ make inferences/ draw conclusions/ convince (Skills and strategy Outcomes), and (b) demonstrate critical thinking and judgment (Skills and strategy Outcomes)” (P. 20)

11/ The passage qualifies the learning situations (Project Outcomes) and (Learners' Outcomes) that can be resolved through production activities that are more or less complex. To do so, reasoning becomes necessary.

12/ Structure of the projects and samples of activities

● In project two students will have a class debate on the importance of ethics in business (Project outcomes), and will collect data/ organise data/ evaluate data and get involved in critical thinking/ evaluate/ judge. To do so, reasoning becomes necessary.

● In project three students will write reports comparing different systems in the world, discuss, take notes/ compare/ synthesise/ draw conclusions/ evaluate, and use critical judgment. To do so, reasoning becomes necessary.

● In project four students will

Discussion, analyse/ synthesise/ evaluate information, compare/ use critical judgment. To do so, reasoning becomes necessary.

● In project five students will make inferences/ predict/ draw conclusions/ use logic/ critical thinking. To do so, reasoning becomes necessary.

● In project six students will discuss, make inferences/ draw conclusions/ convince, demonstrate critical thinking and judgment. To do so, reasoning becomes necessary.

In table 17 the analysis of the findings shows that ‘the testing of hypotheses and possible solutions’ is not incorporated into the program.

Table 18

Category Six: The Reflecting Component in the Program

Examples about reflecting (Illustrative passages from the program)	Coding Rules	Lacks about the reflecting component
<p>1▶ (The teaching of English involves not only the acquisition of language and communication skills, but also the... development of critical thinking and analysis...)(P. 3)</p>	<p>1/ Critical thinking and analysis in EFL are both necessary for effective problem solving. At this stage reflection is crucial.</p>	
<p>2▶ (The more English is mastered by the students the better the students' success and development in an academic, scientific, and professional environment increasingly demanding and requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations.)(P. 3)</p>	<p>2/ Students' mastery of EFL is best translated by their capacity to solve complex problems. Such capacity is foundationally based on reflection.</p>	
<p>3▶ (The methodological/technological objectives are set to: -consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities. - Encourage reflexion at all the levels of learning.)(P. 4)</p>	<p>3/ The methodological/technological objectives are set to consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities. - Encourage reflexion at all the levels of learning reflection as a key component in problem solving.</p>	<p>Though the 'reflecting' component has been integrated into the curriculum in general, particular consideration of the component through the integration of its fundamental ingredients lacks.</p>
<p>4▶ The achievements are better fixed because the various types of knowledge are being used in the problem solving process in constantly new learning situations.) (P. 5)</p>	<p>4/ The pedagogy makes leaning more effective: The achievements are better fixed because the various types of knowledge are being used in the problem solving process in constantly new learning situations. At this stage reflection is crucial.</p>	
<p>5▶ (From one year to another, from one cycle to another, the acquired knowledge is gradually reinvested and put at the service of increasingly complex skills.) (P. 5)</p>	<p>5/ The acquired knowledge is gradually reinvested and put at the service of increasingly complex skills. At this stage reflection is crucial.</p>	
<p>6▶ (A learning situation (corresponding to Project Outcomes) is an</p>	<p>6/ The passage shows that The Project Outcomes foster the</p>	

exploratory situation which:

-It is to be solved collectively (in groups).(P. 6)

7 ► (An integration situation (corresponding to Learners' Outcomes) is a reinvestment situation that:

-Allow the students to solve a problem individually

-Leads to the integration of know-what and know-how, which all have been discussed in the classroom. (P. 6)

8 ► (Both learning and integration situations are meant to foster the students' initiative and creativity.) (P. 7)

9 ► (Doing projects collectively is meant to foster the students' motivation and interest, allow the students to acquire effective work methods, as well as develop their responsibility and autonomy. The pedagogy of integration requires self-assessment, peer-assessment, and assessment carried out by teachers.)(P. 7)

10► (Competency 1: Interact orally

This competence is meant to allow the students to interact, that is, to negotiate, to persuade, to give their opinions, to take and give the floor and this during brainstorming or when debating and solving problems collectively.)(P. 7)

11 ► *Des situations d'apprentissage (Project Outcomes) et des situations d'intégration (Learners' Outcomes):*

These situations are problem situations that can be resolved through production activities that are more or less complex. (P. 8)

12 ► Structure of the projects and samples of activities

acquisition of new knowledge and resolution of problems collectively. At this level reflection should be stressed.

7/ It is shown in the passage that an integration situation (corresponding to Learners' Outcomes) allows the students to solve a problem individually, which becomes possible through reflection that is closely linked to know-how.

8/ The passage shows that both learning and integration situations are meant to foster the students' initiative and creativity, which become possible through reflection as a key component of problem-solving.

9/ Doing projects collectively is meant to foster the students' motivation and interest, allow the students to acquire effective work methods, as well as develop their responsibility and autonomy. The pedagogy of integration requires self-assessment, peer-assessment, and assessment carried out by teachers. At this stage reflection is crucial.

10/ The excerpt illustrates the students the Competency 1: debating and solving problems collectively. At this stage reflection is crucial.

11/ (Project Outcomes) et *des situations d'intégration (Learners' Outcomes):*

These situations are problem situations that can be resolved through production activities that are more or less complex. At this stage reflection is crucial.

12/ Structure of the projects and samples of activities

•In project two students will have a class debate on the

Pupils will: (Project Two)

(a) **collect data/ organise data/evaluate data(Skills and strategy Outcomes), and (b) be involved in critical thinking/evaluate/judge(Skills and strategy Outcomes)** (P. 15)

Pupils will: (Project Three)

(a) **take notes/compare/synthesise/ draw conclusions/evaluate(Skills and strategy Outcomes), and (b) use critical judgment(Skills and strategy Outcomes)** (P. 16)

Pupils will: (Project Four)

(a) **be involved in a panel discussion(Project outcomes), (b) discuss issues related to the effects of advertising on people (Learners' outcomes), (c) analyse/ synthesise/ evaluate information (Skills and strategy Outcomes), and (d) compare/ use critical judgment (Skills and strategy Outcomes)** (P. 17)

Pupils will: (Project Five)

“make inferences/ predict/ draw conclusions/ use logic/ critical thinking(Skills and strategy Outcomes)” (P. 18)

Pupils will: (Project Six)

“(a) compare/ make inferences/ draw conclusions/ convince(Skills and strategy Outcomes), and (b) demonstrate critical thinking and judgement(Skills and strategy Outcomes)” (P. 20)

13► L’auto-évaluation (« self-assessment ») : L’élève se fait critique de son propre travail, et ce dans le but de s’améliorer. (P. 22)

► (L’auto-évaluation (« self-assessment ») :

The students criticise their own work in order to improve.)

importance of ethics in business (Project outcomes), and will **collect data/ organise data/evaluate data and get involved in critical thinking/evaluate/judge.** At this stage reflection is crucial.

•In project three students will write reports comparing different systems in the world, discuss, take notes/compare/ synthesise/ draw conclusions/evaluate, and use critical judgment. At this stage reflection is crucial.

•In project four students will Discussion, analyse/ synthesise/ evaluate information, compare/ use critical judgment. At this stage reflection is crucial.

•In project five students will make inferences/ predict/ draw conclusions/ use logic/ critical thinking. At this stage reflection is crucial.

•In project six students will discuss, make inferences/ draw conclusions/ convince, demonstrate critical thinking and judgment. At this stage reflection is crucial.

13/ The passage indicates that self-assessment allows the students to self-criticise. This can, for example, be done when solving problems stressing reflection.

One can see from table 18 that though the ‘reflecting’ component has been integrated into the curriculum in general, particular consideration of the component through the integration of its fundamental ingredients is not stressed in the programme.

IV-2-2- Discussion of the Findings Obtained through the Analysis of 3S EFL Program

The findings displayed in the previously mentioned tables are to be discussed in relation to the 3C3R mode by Hung(2006) stressing the analysis of ‘core components’, namely ‘content’, ‘context’, and ‘connection’ and ‘processing components’: ‘researching’, ‘reasoning’, and ‘reflecting’.

IV-2-2-1- Discussion of the Findings about ‘Content’

It is shown in the Table 13 that ‘content’ is incorporated in the program throughout various passages. To illustrate the case, one can read from the program:

Plus cette langue sera maîtrisée, meilleurs seront la réussite de l’élève et son épanouissement dans un environnement académique/scientifique et professionnel de plus en plus exigeant, et faisant appel à sa capacité à résoudre des problèmes de plus en plus complexes dans des situations diverses et variées. (P. 3).

The more English is mastered by the students the better the students’ success and development in an academic, scientific, and professional environment increasingly demanding and requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations. (P. 3)

Such a passage is a conjugation of EFL mastery and the resolution of complex problems in new situations. This can take place only if the to be-learned content turns around tasks that favor the generation of creative solutions to complex problems by the students. In this vein, Hung (2006) contends that fundamental aspects in the content component are ‘breadth’ and ‘depth’ of the problem scope (p. 58). In the aforementioned example, the aspects appear in the statement “*to solve increasingly complex problems in various and varied situations*” as an objective of the curriculum to be reached by the students through the mastery of English. Such an objective pinpoints to the inherent feature of the ‘content’ component that is ‘aligning with curricular standards’ (Hung, 2006, p. 58) in that instructional designers and teachers are

called on to align problem-based learning problems with curricular standards that entail key concepts and topics that are meant to serve the students' needs in EFL.

It is to be mentioned that PBL problems should be set with the required depth by putting focus on two criteria 'complexity' and 'ill-structuredness' (Koschmann et al. 1994; Weiss, 2003; as cited Hung, 2006, p. 59). If the learners are assigned problems that can be easily solved by making reference to recall of data, the learners are likely to be demotivated and prevented from reaching deep understanding (Hung, 2006, p. 59). At this stage, 'complexity' and 'ill-structuredness' can be viewed as triggers of the students' creative potentialities to handle with complex problem situations that cannot be solved only through mere knowledge application. The advantage of this is that the students are encouraged to embrace one of the traits of critical thinking, namely 'depth' and 'breadth' (Paul & Elder, 2004).

To effectively handle complex problem situations, the students are required to have solid background knowledge to be understood in terms of mastery. This is clearly indicated in the previously provided example: "plus cette langue sera maîtrisée" (The more English is mastered by the students). Such mastery is the means leading to effective problem solving. Accordingly, the teaching /learning environment is meant to be motivating and stimulating in the sense that the students need to be appropriately guided by their teachers towards effective knowledge construction. This corroborates with Williams and Burden's (1997) idea that the students' motivation is impacted by the teaching/learning environment and the teaching methods.

Following the analysis of the findings, Benjamin Bloom (1956) provided a model to reach mastery. The model is labeled 'Mastery Learning' incorporating five components; 'behavioral instructional objectives', 'teaching' 'assessment', 're-teaching' and 're-assessment'. This gives the students the chance to get feedback about their performance

before moving to the next learning stages. Involving the students in the five stages in a recurrent way would allow them to develop their language skills, as well as their cognitive and metacognitive abilities. Though this seems to be beneficial and effective, it is, however, very demanding in that it requires too much time, and the classes should not be large. Another illustrative case of the 'content' component is the following:

Des situations d'apprentissage (Project Outcomes) et des situations d'intégration (Learners' Outcomes) : Ces situations sont des situations-problème pouvant se résoudre à travers des activités de production plus ou moins complexes.(P. 8)

Des situations d'apprentissage (Project Outcomes) et des situations d'intégration (Learners' Outcomes): These situations are problem situations that can be resolved through production activities that are more or less complex.

The excerpt suggests that the students are given the chance to construct knowledge by their own activity; that is, they produce knowledge rather than reproducing it by handling problem situations that are more or less complex. In this vein, it has to be admitted that the students' problem solving capacities have to be nurtured by assigning them projects that would make them feel responsible to find out resolutions to new problems. There is no way of knowing whether the students are competent problem solvers until they undertake new complex tasks that involve them in deep thinking and reasoning. This line of thinking runs up against teacher centered approaches that have endlessly taken students for passive receivers of knowledge (See Dewey, 1925, 1938; Richards & Rodgers, 2001).

The passage 'Des situations d'apprentissage' (Project Outcomes) serves as a basis on which it becomes possible to further the analysis stating that cautiously selected projects and effective teachers' guidance, joined together, are fundamental aspects to be stressed in EFL teaching so that there shall be among the students as little passivity as possible. By so doing, the emergence of suitable opportunities for adjustments, interaction, and reflection becomes

possible. The students would feel a greater sense of autonomy and belonging to a dynamic group capable of sharing and debating knowledge creatively and in a principled way (See Markham, Larmer & Ravitz, 2003; Diffily & Sassman, 2003). Integrating new contents to the projects often is a way to attract the students' attention to the necessity of going beyond the assimilation stage to reach the critical reasoning stage. The idea, in a nutshell, is that implementing creative project-based learning is a key to successful problem solving.

It has already been mentioned that both of 'complexity' and 'ill-structuredness' make up the 'depth' of the problems. In the program, the 'complexity' ingredient is explicitly mentioned. This is a positive aspect. Nevertheless, the aspect of 'ill-structuredness' is not covered in the analysed corpus. In order to set a model of curriculum shift from the traditional model whose stress is on content learning to the problem-based learning model that is based on students' problem solving and teachers' guidance, Oon-Seng (2003) clearly articulates that providing students with hands-on experience in solving unstructured problems is at the heart of effective problem solving. In short, ill-structuredness is the aspect that calls on the students to probe for creativity and innovation stressing deep understanding of the to-be solved problems.

To solve ill-structured and complex problems students need to adjust the information in a structured way so that the generation of creative solutions becomes possible. For example, Lubart and Mouchiroud (2003) consider that "in the creative process existing information is restructured, reorganized, or combined. In routine, noncreative problem solving, information is recalled and understood using existing categories" (p. 138). This is an indication that more efforts are required in solving ill-structured problems. This implies that the teachers' coaching of the students along with the problem solving process is of paramount importance.

A careful consideration of the program allows to infer that the ‘content’ component as a crucial aspect of effective problem solving has been incorporated by the designers. However, it is to be mentioned that in the program stress is basically put on the ‘complexity’ criterion, and the ‘ill-structuredness’ criterion has been neglected. In this regard, Duch et al.(2001) clarify “A complex, ill-structured problem will challenge students to go beyond simple plug-and-chug to solve it” (p. 51). This suggests that ill-structured problems offer the students a phase where they become able to expose their higher-cognitive skills that form the basis of deep understanding and creative problem-solving.

In solving ill-structured problems, students have to come to grips with uncertainties about the right strategies to use, the data to include for solution generation, the alternatives, and the actions to take in evaluating the solutions. All these represent a valuable key to developing the students’ engagement in solving problems by making them feel responsible in handling a set of tasks at the same time. For example, Lubart and Mouchiroud (2003) highlight “in the creative process existing information is restructured, reorganized, or combined. In routine, noncreative problem solving, information is recalled and understood using existing categories” (p. 138). Shaped differently, the restructuring of ill-structured problems is a crucial step to go through in creative problem solving that cannot efficiently be handled without stressing deep understanding and analysis.

IV-2-2-2-Discussion of the Findings about ‘Context’

The findings presented in Table 14 indicate that a set of passages illustrate the ‘context’ component of problem solving. The following are illustrative examples: « *L’enseignement de l’anglais implique, non seulement l’acquisition de compétences linguistiques et de communication, mais également... le développement d’un **esprit critique** et d’**analyse**..* » (P. 3). (The teaching of English involves not only the acquisition of language and communication skills, but also... the development of critical thinking, analysis....). The

passage, besides the acquisition of language and communication skills, puts emphasis on the development of critical thinking, analysis. This can take place only in a context that favors complex-problem solving. In this regard, Torp and Sage (1998) suggest that “the contextual information of the problems helps learners link the knowledge constructed and skills acquired to related situations in real life” (as cited in Hung, 2006, p. 59). The point is closely related to authentic tasks that would benefit learners in classroom as well as out of classroom contexts (Selinger, 200; as cited in Pritchard, 2009, p. 26). This idea has pivotal resonances about the importance of the context of learning. In other words, contextualized instruction represents challenge and variety as two crucial ingredients that stimulate the students’ motivation. This can be made clearer by making reference to Bruner (1996) and Brown et al. (1989) who stress the need for authentic learning tasks.

Students’ engagement increases when they see the utility of the tasks they undertake outside and inside school contexts. Students are more likely to get motivated to solve problems they view reflecting their needs and aspirations as citizens who would implement their knowledge in the real world. This is clearly articulated in Duch et al. (2001, p. 48) statement that a good problem is basically the one that stimulates students’ interest and encourages them strive for deeper understanding of the to-be learned concepts. In addition, the problem must link knowledge and skills to real-life situations. Students’ familiarity with the problem context would enhance their motivation in effectively getting in the problem solving process. The students’ familiarity with the context should be understood in terms of the subject matter being studied and not as an instance of routine learning. More importantly, this could be explained in the field of testing in terms of ‘content validity’ (See Hughes, 2003; Popham, 2003). In addition, stress should be on deep understanding, which is a prerequisite stage for creative problem solving.

The degree of authenticity should be in accordance with the students' level, needs, and motivation. At this stage, the teachers are required to make sound decisions about the authentic tasks to assign their students (See Mishan, 2004). Though this seems to be challenging and time consuming, the teachers could put emphasis on the most important instructional objectives to be reached (See Marzano, 2001).

The findings about the 'context' suggest that the program does not offer hints about the three foundational elements to be stressed when dealing with the context component: 'contextual validity', 'degree of contextualization', and 'students' motivation' (Hung, 2006, p. 60). Accordingly, the teachers' responsibility is to handle the 'context' component with caution. For example, 'degree of contextualization' should be appropriate in the sense that 'over-contextualized' problems may make the students feel submerged in needless and irrelevant data, and 'under-contextualized' problems impede deep understanding because they do not cover basic and crucial learning items (Hung, 2006, p. 60).

In the program, extra examples about the 'context' component are the following:
 « Cette pédagogie (La pédagogie de l'intégration) rend aussi les apprentissages plus efficaces : les acquis sont mieux fixés car les savoirs sont mobilisés dans le cadre de la résolution d'un problème et dans des situations d'apprentissage sans cesse nouvelles pour l'élève. » (P. 6)
 (the pedagogy of integration is adopted to ensure that learning is becoming more and more effective and that the acquired knowledge is being used to solve new ongoing problematic situations). The excerpt stresses the importance of new problematic situations; because, it is at this stage that the students approach tasks that allow them to make sense of what they experience in that their curiosity to know about their creative abilities is likely to become stronger. However, this should take place by taking into account the students' learning styles as Pritchard (2009) clarifies that the learning styles that the students have should be appropriately considered by the teachers when requiring the students to solve new language

problems that they have never encountered before so that the learners could choose what they need in terms of problem solving approaches.

It is revealed from the findings that the ‘context’ component is incorporated by the designers in the program. Indeed, one can read from the materials that « Plus cette langue sera maîtrisée, meilleurs seront la réussite de l’élève et son épanouissement dans un environnement académique/scientifique et professionnel de plus en plus exigeant, et faisant appel à sa capacité à résoudre des problèmes de plus en plus complexes dans des situations diverses et variées. » (P.3) (The more English is mastered by the students the better the students’ success and development in an academic, scientific, and professional environment increasingly demanding and requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations.)

However, it should be mentioned that “In considering the context component of PBL problems, contextual validity, degree of contextualization, and students’ motivation are three important design elements” (Hung, 2006, p. 60). In the program the three elements have not been specified. The ‘context component’ in the program has been mentioned in a general way without providing particular hints about it. Clearly, the three elements not only represent landmarks for effective problem solving but support teachers in designing authentic tasks that would become a source of students’ motivation to handle problematic situations with higher engagement.

In the context of motivation in problem solving, Donham et al. (2001) highlight that exporting knowledge to real-world problems should be prioritized by teachers by stressing authentic problems that invite students to apply their solutions in various meaningful contexts that resemble those to be encountered in real-life situations. In addition, Lubart and Mouchiroud (2003) estimate that students’ actions in solving problems creatively are fundamentally inherent to their motivation and engagement to achieve their academic goals

through solution creation. Thus, the role of the teacher is to expose students to an environment that is conducive to such an endeavor or simply to a motivating problem solving context.

IV-2-2-3- Discussion of the Findings about ‘Connection’

As it can be noticed, the program includes many instances embodying the ‘connection’ component. To illustrate the point, one can read: « L’enseignement de l’anglais implique, non seulement l’acquisition de compétences linguistiques et de communication, mais également ... le développement d’un **esprit critique** et d’**analyse**... » (P. 3) (The teaching of English involves not only the acquisition of language and communication skills, but also...the development of critical thinking and analysis ...). The passage puts stress on the acquisition of critical thinking and analysis by students as two skills that would allow them to connect their linguistic knowledge to problem-solving situations. The idea is that for an effective problem solving the students are required to relate their background knowledge into “an effective knowledge base network and be able to cross-reference related concepts” (Jacobson & Spiro, 1994; Spiro et al., 1988; as cited in Hung, 2006, p. 61). The aforementioned example signals the importance of establishing a link between the acquired linguistic knowledge and skills and the development of critical thinking and analysis.

It is worth noting that the integration of both (knowledge and skills and the development of critical thinking and analysis) requires practice and guidance. For so doing, teachers can organise tasks into meaningful parts, assigning students communication tasks, and incorporating a range of ill-structured problems into classroom practice. This can be seen to refer to the principles of constructivism in terms of classroom dynamics and students’ involvement in higher-cognitive skills. More importantly, the students are given the chance to take risks to handle new problematic situations. This is a basic instructional aspect that teachers need to care about. The significance of the point is shown in Renate Caine’s

statement “If children are to think critically, they must feel safe to take risks”(Poole,1997;asquoted in Pritchard, 2009, p. 97).Put simple, students need to be stress-free if they want to demonstrate critical reasoning and creative problem-solving.

Additional examples about what has been discussed about the ‘connection’ component are : « *Objectifs méthodologiques/technologiques : Consolider les capacités intellectuelles de l’élève telles que l’analyse, la synthèse, l’évaluation à travers des activités pertinentes* »(p.4). (**The methodological/technological objectives are set to:** Consolidate the students’ intellectual capacities such as analysis, synthesis, and evaluation through relevant activities). The higher-cognitive levels in Bloom’s Taxonomy: ‘analysis’, ‘synthesis’, and ‘evaluation’ require the students to make decisions about the interconnection that would exist between the initial state of problem solving, during which data are collected, and the final state involving solution generation. The analysis, synthesis, and evaluation skills invite the students to reflect upon what they have learnt. This is a strong indicator that a link between the previously acquired knowledge and the newly created solutions should be established (Bloom, 1956; Piaget, 1970).

The ‘connection’ component can also be illustrated through the example « *Une situation d’apprentissage (correspondant à Project Outcomes) est une situation d’exploration qui : (a) favorise les nouveaux apprentissages (des savoirs, des savoir-faire et des savoir-être), (b) se résout collectivement (par groups)* » (**P. 6**). (A learning situation (corresponding to Project Outcomes) is an exploratory situation which: (a) promotes the acquisition of new knowledge in terms of know-what, know-how-to-do, and know-how-to-be, (b) it is to be solved collectively).The Project Outcomes favor the acquisition of new knowledge and resolution of problems collectively. A connection between know-what, know-how-to-do, and know-how-to-be should be made. Group problem solving lies at the heart of

cooperative learning, which is a constructivist approach that stresses exchange of knowledge and collective generation of solutions to problems.

There is no doubt that the students' capacities to establish links between a range set of knowledge elements is a fundamental aspect in education. As it has already been mentioned, the 'connection component' is included by the designers in the program. What is lacking, however, is that there is no specification of the connections nature in the program. In this regard, Hung(2006) argues that a crucial aspect in problem solving is the establishment of links and connections between the various notions and concepts that are relative to problem solving when applying problem resolutions in various domains and contexts. Accordingly, this should be emphasized in the program so that both teachers and students become enlightened about the importance of the 'connection component'.

In speaking about analogical problem solving, Davidson (2003) explains that when connection is set between a familiar problem situation and a new one, the problem solver is likely to understand the new problem situation. This indicates that various types of information and alternatives are subjected to selective and critical comparison. The latter is to be supported by deep analysis of the data in connection with the problem. The students need to be constructively and motivationally supported by their teachers to get their activities done. Teachers' instructions and feedback in this regard are of paramount importance. The more the students are constructively guided to solve creative problems, the more they develop a greater sense of responsibility to become effective problem solvers.

IV-2-2-4- Discussion of the Findings about 'Researching'

All along the analysed program, the 'researching' component is included in a set of passages as in:

Plus cette langue sera maîtrisée, meilleurs seront la réussite de l'élève et son épanouissement dans un environnement académique/scientifique et professionnel de

plus en plus exigeant, et faisant appel à **sa capacité à résoudre des problèmes de plus en plus complexes dans des situations diverses et variées.** (p. 3)

The more English is mastered by the students the better the students' success and development in an academic, scientific, and professional environment increasingly demanding and requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations.

It can be inferred from the excerpt that students' mastery of EFL is best translated by their capacity to solve complex problems. Such capacity is foundationally based on problem understanding and search for relevant data. In addition, the students are required to search for relevant strategies that allow them to bridge the gap between the initial states of the problematic situations and the final states. At this stage, it would be beneficial to encourage students to make reference to Polya's model (1979), Branford and Stein's model (1989) and Sternberg's model (1991) of problem solving explained and discussed previously.

Effective data and strategy researching for creative problem solving requires the students to exhibit consistency and patience. For this reason, it is important to spend enough time to collect relevant data and select appropriate strategies that are likely to lead to successful problem resolution. If the 'researching' component is not taken into account by the students then it will be expected that the problem solving process will become more difficult leading to decrease in students' motivation to construct intelligent answers to problems that are featured by complexity. Understandably, there should be more emphasis to be given to strategic and principled learning that would boost the intellectual development of the students in a context in which the ultimate goals of teaching /learning practices are oriented towards life-long learning whose effective problem-solving is a crucial tenet.

A critical consideration of the findings about the 'researching' component indicates that information about its nature in the program is not provided. In this vein, it should be

remembered that the researching component means that students are mainly required to look for the appropriate information to be used in problem solving by putting focus on two elements: ‘goal specification’ and ‘context specification’. The first element allows students to look for relevant information that is related to the problem, while the second highlights the necessity of a particular application of the domain knowledge in which the problem occurs (Hung, 2006, pp. 63-64).

Another example of ‘researching’ is « *Objectifs méthodologiques/technologiques : Consolider les capacités intellectuelles de l’élève telles que l’analyse, la synthèse, l’évaluation à travers des activités pertinentes* »(P.4). (The methodological/technological objectives are set to: Consolidate the students’ intellectual capacities such as analysis, synthesis, and evaluation through relevant activities). Such intellectual capacities are examples of higher-order thinking skills that the students need to acquire through effective learning and practice. The students are required to understand the problems and search for relevant data. If students’ attention is drawn to the fact that solving problems creatively requires collection and analysis of the data relative to the problem, as well as the synthesis and evaluation of possible alternatives, then the students are on the right way to approach the problematic situations in question.

The attainment of the desired outcomes is more likely to happen thanks to the involvement of the students’ awareness and their cognitive and meta-cognitive capacities in the problem solving process. In this context, Pritchard (2009, p. 27) explains “Obviously the role of cognition in the processes of learning is crucial. ‘Metacognition’ refers to the idea of an individual’s considering, being aware of and understanding their own mental (cognitive) processes and ways of learning. It is cognition about cognition.” The author (Pritchard) adds “An individual’s awareness of their own thought processes will have a bearing on the way

that they view their own learning and is likely, with encouragement, to lead to recognition of the ways in which they might learn most effectively” (Pritchard , 2009, p. 27).

It is to be mentioned that the ‘researching’ component is included by the designers in the program. However, lacks about the component are to be highlighted. For example, ‘goal specification’ and ‘context specification’ are lacking in the program. In this vein, Hung (2006) contends that ‘goal specification’ and ‘contexts specification’ represent two crucial aspects of an efficient researching component of problems in PBL and that the problem contextual information should support the researching component (p.63).The finding corroborates with what Greiff et al. (2014) have found that students need to be equipped with ‘domain-general’ skills for solving problems and ‘domain-specific factual knowledge’ and problem resolution strategies. The idea is that effective researching is the one that occurs in a meaningful context in which authentic tasks that are akin to real-world problems are assigned to the students in a constructive way.

In the context of ‘researching component’ in problem solving, Davidson (2003) sheds light on the crucial role of searching in problem solving by presenting it as the key to effective selection of the relevant information and intelligent representation of problems solving. At this stage, it should be stated that searching requires analysis of information and critical comparison of data without which the solver’ mental representation of the problem becomes out of reach.

The analysis and critical comparison of the information to include in problem resolution are aspects of higher-order thinking skills (Quellmalz, 1987). The students, therefore, need to be encouraged to get involved in such skills that allow them to make the path to solution clearer. Subsequently, creative problems and teacher’s constructive feedback should be stressed and become an inherent aspect of the teaching/learning process.

IV-2-2-5- Discussion of the Findings about ‘Reasoning’

The obtained findings exhibit the ‘reasoning’ component via a range of passages included in the program. By way of illustration, one can read « *Objectifs méthodologiques/ technologiques: (a) consolider les capacités intellectuelles de l’élève telles que l’analyse, la synthèse, l’évaluation à travers des activités pertinentes, (b) Encourager la réflexion à tous les stades de l’apprentissage* »(p. 4).(The methodological/technological objectives are set to: (a) consolidate the intellectual capacities of the students such as analysis, synthesis, and evaluation through relevant activities, and (b) encourage reflexion at all the levels of learning). It can be argued that whenever the students make use of their higher-level thinking skills including analysis, synthesis, and evaluation to do relevant tasks the reasoning component should necessarily be stressed. Moreover, reflexion is another cognitive skill that is inherent to reasoning in that the duty of the students to reason critically implies their responsibility to reflect on data and alternatives in critical manner.

In addition to the example mentioned previously, the ‘reasoning’ component is included in the following:

Pupils will: (Project Two)

“(a)collect data/ organise data/evaluate data(Skills and strategy Outcomes), and (b) be involved in critical thinking/evaluate/judge(Skills and strategy Outcomes)” **(P. 15)**

Pupils will: (Project Three)

“(a) take notes/compare/synthesise/ draw conclusions/evaluate(Skills and strategy Outcomes), and (b) use critical judgment(Skills and strategy Outcomes)” **(P. 16)**

Pupils will: (Project Four)

“(a) be involved in a panel discussion(Project outcomes), (b) discuss issues related to the effects of advertising on people (Learners’ outcomes), (c) analyse/ synthesise/ evaluate

information (Skills and strategy Outcomes), and (d) compare/ use critical judgment (Skills and strategy Outcomes)” (P. 17)

Pupils will: (Project Five)

“make inferences/ predict/ draw conclusions/ use logic/ critical thinking(Skills and strategy Outcomes)” (P. 18)

Pupils will: (Project Six)

“(a) compare/ make inferences/ draw conclusions/ convince(Skills and strategy Outcomes), and (b) demonstrate critical thinking and judgment(Skills and strategy Outcomes)” (P. 20)

The examples point to higher-cognitive skills: ‘analysis’, ‘synthesis’, ‘evaluation’, ‘inference’, ‘critical thing’, and ‘judgment’. When dealing with such skills, students seem to get engaged in reasoning as a mental activity that is of a particularly powerful force on what is being done during the problem solving process. In this regards, Hung (2006) clarifies that data analysis and the testing of hypotheses and possible solutions are both incorporated in problem solving. Both ‘researching’ and ‘reasoning’ are key elements in problem-based learning.

A critical consideration allows to infer that the component ‘testing of hypotheses and possible solutions’ is not included in the program. Such an element lies at the heart of problem solving as it allows the students to make decisions about the process and the product of the problem solving cycle. Marzano (2001) considers ‘testing hypotheses’ as an instance of procedural knowledge and higher cognitive skills. Accordingly, the integration of the element (‘testing of hypotheses and possible solutions’) in the program seems to be necessary.

The ‘testing of hypotheses and possible solutions’ is, as it has already been mentioned, a central aspect in the ‘reasoning’ component. The analysis of the findings shows that ‘the testing of hypotheses and possible solutions’ is not incorporated into the program. The effects of this on students may be viewed in terms factors responsible for the decrease of the

students' capacities to reach the stage of self-evaluation and autonomy to consider the validity and effectiveness of their problem solving strategies. The students need to be encouraged to take the responsibility of their own learning by having a greater sense of self-efficacy (Bandura, 1997).

It is worth noting that through the practice of testing hypotheses and possible solutions, the students are oriented towards developing new skills in terms of self-awareness and deep understanding of their own work and level of competence. By testing hypotheses, the students are required to analyse the information of the variables relative to the problem. This should become among the students a routinized activity in ways that foster the flow of the problem solving process. In this context, Bagayoko et al. (2000) assert that students' proficiency in solving problems is constructed by being exposed to and practice through time the required knowledge, skills, as well as the strategic and behavioral knowledge. Following this, the 'testing of hypotheses and possible solutions' should be an essential practice in the teaching/learning environment.

Lacking this capacity (testing hypotheses), the learning activity may lead to the emergence of recurrent practices whose main tenet is a mere reproduction of knowledge among the students. Accordingly, the students teaching/learning practices will always turn around the accumulation of information and recall of knowledge as two basic features of 'learning by memorization' (Oon-Seng, 2003, p. 18). The students need to use their memory to store knowledge that can be applied to new contexts in which problems that trigger inquiry and creativity are stressed. Memorization should never be neglected, but it should never be considered as an end in itself.

IV-2-2-6-Discussion of the Findings about 'Reflecting'

Of the instances that illustrate the findings about the 'reflecting' component are the following:

Plus cette langue sera maîtrisée, meilleurs seront la réussite de l'élève et son épanouissement dans un environnement académique/scientifique et professionnel de plus en plus exigeant, et faisant appel à **sa capacité à résoudre des problèmes de plus en plus complexes dans des situations diverses et variées.** (P. 3)

The more English is mastered by the students the better the students' success and development in an academic, scientific, and professional environment increasingly demanding and requiring the students to use their learning abilities to solve increasingly complex problems in various and varied situations.

It can be deduced from the passage that students' mastery of EFL is best translated by their capacity to solve complex problems. Such capacity is foundationally based on reflection. Learners need to be reflective enough to distinguish between valid and invalid data, between effective and ineffective strategies to be used as means of fruitful and successful problem solving. At this level, the students need help making their reflection a key to creative knowledge construction. This alludes to the teacher's responsibility in encouraging the students to take initiatives in linking their previous knowledge to the new one in a more creative and original way. The students' ability to ask their teachers pertinent questions about how to be creative and original is vitally important. In line with this, Popper (1979) contends that problem posing is more important than answer giving. The students should continuously feel at ease to ask for guidance and clarification, and never let shyness impede their curiosity to get help whenever necessary. This is, in a nutshell, how education should function within the constructivist approach (Vygotsky, 1978; Bruner, 1996).

Additionally, another passage that illustrates the findings about the 'reflecting' component is: « *L'enseignement de l'anglais implique, non seulement l'acquisition de compétences linguistiques et de communication, mais également ... le développement d'un esprit critique et d'analyse...* » (p. 3) (The teaching of English involves not only the

acquisition of language and communication skills, but also...the development of critical thinking, analysis ...). The analysis of the passage suggests that critical thinking and analysis in EFL are both necessary for effective problem solving. At this stage, reflection is crucial. It must be remembered that not all types of problems require reflection. Indeed, mechanical drills are instances of problems that can be solved without making recourse to reflection or critical thinking, or analysis. In this vein, Hung (2006) sees that learners' autonomy, self-regulation, and metacognitive skills can be greatly enhanced by integrating into PBL problems the reflection component. In brief, when the students reflect on their own learning during the problem solving process, this implies that other mental activities such as evaluation and critical thinking are being undertaken by the students.

About the 'reflecting' component, it is also mentioned in the program that « *Cette pédagogie (La pédagogie de l'intégration) rend aussi les apprentissages plus efficaces : les acquis sont mieux fixés car les savoirs sont mobilisés dans le cadre de la **résolution d'un problème** et dans des situations d'apprentissage sans cesse nouvelles.* (p.5). » (This pedagogy makes learning more effective: The achievements are better fixed because the various types of knowledge are being used in the problem solving process in constantly new learning situations.) When the problems are new and the students cannot find out the answers in a mechanical way, the students' metacognition is then crucial. In this regard, Flavell (1985) defined metacognition "as including both metaknowledge- the knowledge a subject possesses about his/her own functioning or about that of others- and the control of one's behavior (management, monitoring, self-checking) by way of that metaknowledge" (as cited in Rozencwajg, 2003, p. 282). The definition clearly indicates that there is a tight link between reflection and metacognition.

Additionally, the programme tells us that « *Les situations d'apprentissage et d'intégration doivent encourager son initiative et favoriser sa créativité.* » (p. 7) (Both

learning and integration situations are meant to foster the students' initiative and creativity.) A deep analysis of the example shows that the students' learning is meant to lead to the integration of set of skills responsible for the attainment of creativity. This is best exhibited when the students generate creative solutions to complex problems, in which reflection comes into play and the integration of higher-order thinking skills becomes pivotal.

Though the 'reflecting' component has been integrated into the curriculum in general, particular consideration of the component through the integration of its fundamental ingredients lacks. Indeed, the curriculum includes a very limited set of cases that deal with self-reflection in general as in the example about self-assessment: "L'élève se fait critique de son propre travail, et ce dans le but de s'améliorer" (p. 22). (The students criticise their own work in order to improve). Another example is about critical thinking like in « L'enseignement de l'anglais implique, non seulement l'acquisition de compétences linguistiques et de communication, mais également... le développement d'un **esprit critique** et d'**analyse**... » (p. 3) (The teaching of English involves not only the acquisition of language and communication skills, but also the... development of critical thinking and analysis...). In this regard, Hung (2006) explains that during formative assessment (while learning takes place) the reflective component allows learners to evaluate and judge their problem solving skills by getting insights into whether:

- (1) they acquire the breadth of knowledge that the PBL problem is designed to cover;
- (2) the depth of their study on the topic is adequate; (3) their research methods are effective and efficient; (4) their reasoning processes are logical and effective; (5) they integrate their knowledge conceptually; and (6) their problem-solving strategies are effective (p. 67).

Students' assessment of their content and procedural knowledge during the problem solving process allows them to make effective decisions about the information to use and which

strategies and methods are appropriate. This means that ‘the know-what’ and ‘the know-how to do’ joined to valid and critical reflection during the resolution of problems should be carefully taken into account. An important implication of this is that the students need to be provided with crucial principles that would allow them to get involved in effective assessment of their problem solving skills. As a result, the six elements set by Hung could be used as remediation to the situation. This would foster the students’ self-reflection, autonomy, and above all their meta-cognitive skills.

Conclusion

Throughout the chapter, focus has been on the evaluation of the assessment parts of the textbook *New Prospects* and the English curriculum designed for BAC classes in Algeria in terms of problem-solving. The results have shown that problem solving is not emphasized in the learning logs of the textbook. Indeed, the percentages indicate that 9.24% of the items deal with problem solving whereas 90.76% do not. As regards the second assessment part, the findings show that 20% of activities of the tests promote problem solving and 80% do not. To improve the assessment parts of the textbook, a set of recommendations have been suggested. Our evaluation has revealed that problem solving has not been stressed in the assessment parts of the textbook *New Prospects*. In fact, in both learning logs and ‘skills and strategies assessments’ the materials do not provide support for assessing problem solving. They are not in line with the principles of constructivism in which the students build knowledge creatively.

Additionally, the core aim of the present chapter has been the evaluation of the English program designed for third-year classes in the Algerian Secondary Schools. The evaluation has been carried out adopting the 3C3R model that encompasses two sets of components: ‘core components’, namely ‘content’, ‘context’, and ‘connection’ along with ‘processing components’: ‘researching’, ‘reasoning’, and ‘reflecting’ (Hung, 2006: 55). The results obtained have suggested that the elements have, to a certain extent, been implemented

in the syllabus, though lacks about particular hints about the elements have been spotted throughout the evaluation process. By way of illustration, the findings have signaled that ‘the testing of hypotheses and possible solutions’ has not been implemented in the program. This may decrease of the students’ capacities to reach the stage of self-evaluation and autonomy to effectively weigh the validity of their problem solving strategies.

Finally, a set of recommendations and suggestions have been provided. This has been done for the sake of improving the evaluated assessment parts of the textbook, as well as the examined and analysed curriculum in regarding the implementation of the problem solving skill in those teaching materials. This allows to answer the first research question: Do the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in The Algerian Secondary School cater for problem solving in a satisfactory way? With No, the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in The Algerian Secondary School do not cater for problem solving in a satisfactory way

As a result, it is to be mentioned that the first hypothesis: Yes, the New Prospects assessment parts and the EFL program designed for Third-year Classes in The Algerian Secondary School cater for problem solving in satisfactory way has been refuted.

Chapter Five: Problem Solving in Some of the Algerian Secondary Schools

BAC Classes: An Analysis of the EFL Teachers' Views

Introduction

The present chapter was set with a new focus to get insights into the EFL teachers' views towards problem solving in some Algerian Secondary schools located in two provinces: Tizi-ouzou and Bouira. The survey was based on a random sample of 50 teachers using a questionnaire. The study was carried out relying on Marzano's (2001) New Taxonomy of Educational Objectives, as well as a set of principles set by scholars (Polya, 1967; Bransford & Stein, 1988) in the field of problem solving. Through the survey, it was intended to answer two essential questions: (1) To what extent do the EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom? And (2) What are the different emerging roles and responsibilities associated with EFL teachers' views towards problem solving?

V-1- Results of the Questionnaire

Results of Section One: General Information about the Respondents

1/ Teaching Experience

Q1: Would you mention your experience in English teaching?

- Less than 5 years
- From 5 to 10 years
- More than 10 years

Table 19

Teaching Experience of the Participants

Work Experience	The Number of Participants	The Percentage
● Less than 5 years	8	16%
● From 5 to 10 years	16	32%
● More than 10 years	26	52%

One can see from the findings displayed in Table 19 that the respondents' teaching experiences vary. Indeed, 5 of them (16%) claimed that they have been teaching for less than 5 years. Another percentage (32%) of the teachers mentioned that their work experience stretches from 5 to 10 years. Finally, the bigger ratio of the participants (52%) opted in their answers for more than a ten-year work experience.

2/ Professional Training

Q2: Have you ever been at training in teaching English as a foreign language?

Yes No

If yes, would you mention the training type?

.....
.....

Table 20

Professional Training of the Teachers

Professional Training	The Number of Participants	The Percentage
Teachers who have received professional training	32	64%
Teachers who have not received professional training	18	36%

As regards the issue of professional training, 32 (64%) of the teachers answered positively, meaning that they went for training periods. On the contrary, 18 (36%) of them said they had never been at training.

Table 21

Type of Training Specified by the Teachers

Teachers	Type of Training
Teacher 1	“University (didactics)”
Teacher 2	“University”
Teacher 3	“The Implementation of the Competency Based Approach”
Teacher 4	“New Teaching Strategies”
Teacher 5	“A probation period in a high school with a teacher trainer followed by a report”
Teacher 6	“ENS training”
Teacher 7	“I have received pedagogical training at the Teachers' Training School”
Teacher 8	“Seminars/workshops”

Teacher 9	“A pedagogical and a psychological training.”
Teacher 10	“In secondary school (2 months).”
Teacher 11	“Seminars”
Teacher 12	“Seminars (twice to 3 times a year).”
Teacher 13	“I attended 6 professional training (prescriptive methodologies in English teaching).”
Teacher 14	“ITE on new programs in the 1990s.”
Teacher 15	“PBL, Learning process, Multiple Intelligences.”
Teacher 16	“Online training/Workshop in a foreign country.”
Teacher 17	“09 months during my first year as teacher of English (non certificated).”
Teacher 18	“I have received pedagogical training at the Teachers’ Training School.”
Teacher 19	“The respondent has not specified the type of training.”
Teacher 20	“Professional development for novice teachers in English Language Teaching and educational psychology programmed by the Ministry of National Education.”
Teacher 21	“About teaching techniques, methods and approaches.”
Teacher 22	“Approaches, methods and techniques of teaching English as a foreign language.”
Teacher 23	“A one year training (theoretical) and one month (practice) in a high school, different approaches, methods and techniques for teaching English.”
Teacher 24	“Pre-teaching training provided by the Ministry of National Education”
Teacher 25	“Just seminars with the inspector”
Teacher 26	“Most effective ways to teach English as a foreign language.”
Teacher 27	“It’s about methodology and assessment.”
Teacher 28	“During my last year at ENS (fifteen days per semester)”
Teacher 29	“I have studied five years in Teachers’ High School”
Teacher 30	“Training in Secondary Schools.”
Teacher 31	“In seminars: teaching the different skills according to the new methods.”
Teacher 32	“Probation/seminars.”

The trained category of the respondents specified that they received training at the Teachers’ training School, at University, during seminars, via the Internet (Electronic training), in ENS; Ecole Nationale Supérieure or in English Higher National School (Algiers) and in Institute of Technology and Education (Algiers), at Teachers’ High School. One teacher received pre-teaching training provided by the Ministry of National Education. Another teacher indicated that he/she received training in the Secondary School. With the exception of one teacher who received a psychological training all the teachers received a pedagogical one.

3/ Teachers' Academic Degree

Q3: Would you specify your academic degree?

Table 22

Teachers' Academic Degree

1/ Licence <input type="checkbox"/>	2/ Master <input type="checkbox"/>	3/ Magister <input type="checkbox"/>	4/ Doctorate <input type="checkbox"/>
Teachers' Academic Degree	The Number of Participants	The Percentage	
Licence	39	78%	
Master	10	20%	
Magister	1	2%	
Doctorate	00	00%	

The majority of the teachers (78%), as it is displayed Table 22, had a Bachelor degree, and (20%) of them had a Master degree, and the Magister degree was held by one teacher only. Finally, none of the informants had a Doctorate degree.

Section Two: Teachers' Views about the Implementation of Problem Solving in the Classroom

Q1: How do you perceive the implementation of problem solving in the classroom in terms of difficulty?

- (1) Very difficult (2) Difficult (3) Slightly difficult
 (4) Slightly easy (5) Easy (6) Very easy

Table 23

Participants' Views of Problem Solving Implementation in Terms of Difficulty

Teachers' View of Problem Solving	The Number of Participants	The Percentage
Very difficult	4	8%
Difficult	18	36%
Slightly difficult	19	38%
Slightly easy	4	8%
Easy	3	6%
Very easy	1	2%
No Answer	1	2%

A wide range of answers were collected from the informants regarding the difficulty of implementing problem solving in the classroom. The results obtained suggest that 4 (8%) of the informants see such a task as being 'very difficult'. In addition, (36%) of the teachers

view it as being ‘difficult’. The answer corresponding to ‘slightly difficult’ was given by (38%) of the participants. The ratio of (8%) of the teachers responded with ‘slightly easy. Finally, (6%) of the teachers view the implementation of problem solving in the classroom as an ‘easy’ task.

Q2: How far do you agree with this: “There is no effective instruction without effective problem solving tasks.”

- (1) Strongly agree (2) Agree (3) Partly agree
 (4) Slightly disagree (5) Disagree (6) Strongly disagree

Table 24

Teachers’ Views of Effective Problem Solving Tasks in Instruction

Teachers’ agreement or disagreement	The Number of Participants	The Percentage
Strongly agree	16	32%
Agree	25	50%
Partly agree	7	14%
Slightly disagree	00	00%
Disagree	1	2%
Strongly disagree	00	00%
No answer	1	2%

The question was asked for the sake of gathering the teachers’ views about the crucial role of problem solving in teaching and learning. Indeed, (32%) strongly agreed, (50%) agreed, (14%) partly agreed, and one teacher (2%) disagreed.

Q3: How far do you agree with this: “All EFL Teachers are required to stress the assessment of students’ abilities to solve new problems.”

- (1) Strongly agree (2) Agree (3) Partly agree
 (4) Slightly disagree (5) Disagree (6) Strongly disagree

Table 25

Teachers’ Views about the Necessity to Assess Learners to Solve New Problems

Teachers’ agreement or disagreement	The Number of Participants	The Percentage
Strongly agree	21	42%
Agree	25	50%
Partly agree	3	6%
Slightly disagree	00	00%
Disagree	1	2%
Strongly disagree	00	00%

On the issue, the informants provided positive answers and views. Indeed, (42%) strongly agreed, (50%) agreed, (6%) partly agreed, and one teacher (2%) disagreed.

Q4: How important is guiding students to develop positive attitudes towards solving novel and complex problems?

- Not important
- Somewhat important
- Important
- Very important

Table 26

The Importance of Guiding Students to Develop Positive Attitudes towards Solving Novel and Complex Problems

The Importance Degree	The Number of Participants	The Percentage
Not important	00	00%
Somewhat important	1	2%
Important	15	30%
Very important	34	68%

On the importance of helping students to solve new problems, the teachers provided the following answers: (68%) of respondents answered with ‘very important’, 30%) answered with ‘important’, (2%) opted for ‘somewhat important’, and no respondent opted for ‘not important.’

Q5: Would you mention the benefits of problem-solving tasks implementation in classrooms?

.....

Table 27*The Benefits of Problem-Solving Tasks Implementation in the Classroom*

The Participants	The Benefits of Implementing Problem Solving Tasks in Classrooms	Themes
Participant 1	<i>“The benefits of implementing problem solving tasks in classroom are helping students to identify and understand the problem before starting to solve it.”</i>	problem identification and understanding
Participant 2	<i>“Implementing problem solving tasks enables learners to be independent and helps them to deal with the real situation problem easily. Furthermore, it enables them to express themselves and develop their abilities and to be responsible citizens.”</i>	independent learners
Participant 3	<i>“It addresses real-life issues that require real-life solutions that can be used or exploited outside the classroom. It also enables learners to re-invest the resources in terms of the ‘knows’ and ‘how to do’. Besides, it is a good opportunity to use cross-curricular competencies and more importantly learners become autonomous.”</i>	Developing students’ autonomy
Participant 4	<i>“Time saving/motivating.”</i>	Increasing students’ motivation/time management
Participant 5	<i>“To prepare learners, future citizens to tackle and solve real-life problems.”</i>	Life-long learning
Participant 6	<i>“Reading novels and short stories.”</i>	Enhancing reading
Participant 7	<i>“- It provides students with opportunities to use their newly acquired knowledge in real-life activities.” “-It encourages students to believe in their ability to think about the solution. They will see that they can apply what they learned to find the solution to a problem.”</i>	Life-long learning and self-confidence
Participant 8	<i>“To make their infer and use their own ideas.”</i>	Inference
Participant 9	<i>“To make them appeal to prior knowledge and increase their will to reflect upon different situations/cope with them.”</i>	Reflection

Participant 10	<i>“Time saving/motivating”</i>	<i>Time management/ motivation</i>
Participant 11	<i>“To develop students’ skills. To be able to solve problems situated in context. Organizing information, making generalizations and drawing conclusions.”</i>	<i>Making generalizations and drawing conclusions</i>
Participant 12	<i>“It is important to realize that being a problem solver is not just an ability; it is a whole mind set. It helps to solve different problems challenging their school business, creating more opportunities for them from real-life situations rather just in the classroom.”</i>	<i>Authentic problem solving</i>
Participant 13	<i>“I think that by implementing problem solving tasks, learners will be able to identify problems, generate ideas, learn to be courageous and then try to solve the problem. When these skills are taught concretely, modeled and reinforced learners can begin to independently tackle the problems.”</i>	<i>problem identification and understanding/ Students’ autonomy</i>
Participant 14	<i>“It helps students analyze situations, cooperate and trying to get to the achievement.”</i>	<i>Analysis/cooperation</i>
Participant 15	<i>“This can help students develop their thinking ability and put them in situations where they rely on themselves and make them construct their own points of view.”</i>	<i>Enhancing students’ thinking abilities</i>
Participant 16	<i>Facing real-life situations.</i>	<i>Life-long learning</i>
Participant 17	<i>“To encourage the learners to enhance their language.”</i>	<i>Language enhancement</i>
Participant 18	<i>“To get independent learners and create self confidence in learners.”</i>	<i>Independent learning/self- confidence</i>
Participant 19	<i>“To improve pupils’ abilities to solve problems either in classroom or outside (in life in general).”</i>	<i>Life-long learning</i>
Participant 20	<i>“It helps learners to face different problems according to the real-life situations and make them ready and rich by different competencies.”</i>	<i>Life-long learning</i>
Participant 21	<i>“Helping learners to experience real-life situations and propose solutions.”</i>	<i>Life-long learning</i>
Participant 22	<i>“To reach the objectives (to develop the students’ writing skill). To help the students reinvest what they have learnt.”</i>	<i>Writing enhancement</i>
Participant 23	<i>“The benefits are enabling learners to make a link between outside and inside so that they will use the target language outside the classroom and inside. Raising their awareness about the problem and that to put them in a real situation and thus it will be interesting for them.”</i>	<i>Life-long learning/awareness raising about problem solving</i>
Participant 24	<i>“It helps students to solve and deal with real-life situations.”</i>	<i>Life-long learning</i>
Participant 25	<i>“Good citizenship/help develop the country.”</i>	<i>Life-long learning</i>
Participant 26	<i>“Preparing a future responsible citizen who can be active and effective.”</i>	<i>Life-long learning</i>

Participant 27	<i>“Helping students to deal with real-life situations.”</i>	<i>Life-long learning</i>
Participant 28	<i>“Solving problem in current life and develop strategies for that.”</i>	<i>Life-long learning</i>
Participant 29	<i>“It might provide them with means to solve any problem situation they may face in their real-life.”</i>	<i>Life-long learning</i>
Participant 30	<i>“It enables the learners to face and overcome the hard realities through assuming responsibility.”</i>	<i>Life-long learning</i>
Participant 31	<i>“I render the teaching learning process more active and enjoyable. This permits learners to develop their own learning strategies, practice and improve their critical thinking abilities.”</i>	<i>Improving the teaching/learning process and students’ critical thinking</i>
Participant 32	<i>“Developing social skills.”</i>	<i>Enhancement of social skills</i>
Participant 33	<i>“Developing social skills and building constructivism.”</i>	<i>Life-long learning</i>
Participant 34	<i>“Improving the ability to obtain and recall information-reinforces understanding and remembering easier. Each student will be given the chance to participate. However, group size in our classrooms and the low level of most of our students may make it really difficult.”</i>	<i>Enhancement of students’ memory and participation</i>
Participant 35	<i>“Build students’ autonomy; promote critical thinking; prepare students for real life, and form responsible citizens.”</i>	<i>Life-long learning</i>
Participant 36	<i>“To help learners use some points they have previously studied in context.”</i>	<i>Contextual practice</i>
Participant 37	<i>“Helping in the learning process.”</i> <i>“To improve the learners’ level.”</i>	<i>Enhancement of students’ level</i>
Participant 38	<i>“Reactivating of acquired knowledge; developing social skills; and developing thinking and learning strategies.”</i>	<i>Active learning</i>
Participant 39	<i>“Preparing learners to real-life problem situations and how to solve them by adopting some specific strategies.”</i>	<i>Life-long learning</i>
Participant 40	<i>“To try to develop critical thinking.”</i>	<i>Critical thinking</i>
Participant 41	<i>“To reuse the tasks in real-life situations, help students to challenge each other in a constructive manner through team work.”</i>	<i>Enhancement of group problem solving</i>
Participant 42	<i>“To boost the creativity of the learner; to enhance group work skills; to help raise a responsible</i>	<i>Enhancement of students’</i>

	<i>individual who helps find solutions rather than complaining about problems.”</i>	<i>creativity</i>
Participant 43	<i>“Autonomy, confidence and responsibility.”</i>	<i>Life-long learning</i>
Participant 44	<i>“The learners will be self-reliant and autonomous, they can face difficult situations with strong self-confidence.”</i>	<i>Autonomy</i>
Participant 45	<i>“The benefits of implementing problem solving tasks in the classroom is to make the learner in difficult and challenging situations to make the leaning process ongoing and more motivating.”</i>	<i>Active learning</i>
Participant 46	<i>“Self-management and responsibility.”</i>	<i>Self-management and responsibility</i>
Participant 47	<i>No answer to the question</i>	<i>No answer to the question</i>
Participant 48	<i>No answer to the question</i>	<i>No answer to the question</i>
Participant 49	<i>No answer to the question</i>	<i>No answer to the question</i>
Participant 50	<i>No answer to the question</i>	<i>No answer to the question</i>

Of all the respondents, except four (8%) of them did not provide any view regarding the benefits of implementing problem solving in the classroom. In this vein, the respondents mentioned a range of advantages of implementing problem-solving tasks in classrooms. Indeed, they mentioned: problem identification and understanding, independent learners, self-expression, effective citizens, developing the students' thinking skills in terms of criticality, creativity, analysis, and inference, developing the students' communication skills, developing the students' self-confidence, life-long learning and autonomy. In addition, the teachers mentioned time saving, the development of students' self-management and

responsibility, reactivating of acquired knowledge; developing social skills; and developing thinking and learning strategies, preparing learners to face real-life problem using particular strategies, raising students' awareness about problem solving as well as improving the teaching learning situations.

Results of Section Three: Teachers' Views about the Teaching of Problem Solving Strategies and Procedures

Q1: According to you, which of the following strategies fit (s) best problem-solving? (You can select more than one strategy).

Table 28

Teachers' Views towards Problem Solving Strategies

The Strategies	The Number and Percentage of the Participants
• To stress analogical problem solving.	74 (67.64%)
• Setting objectives as solutions and searching for the means leading there.	72 (67.64%)
• To employ general problem solving rules like heuristics.	3 (6%)
• To solve problems using algorithms.	5 (10%)

Remark: One participant representing (2.94%) has not answered the question.

As regards the teachers' view about the best strategies they you think fit(s) best problem-solving, the results show that (67.64%) of the teachers opted for 'To use a solution to a similar, earlier problem to help in solving a new one' and "To identify the "ends" you target and then figure out the "means" you will use to reach them". In addition, (6%) of the respondents chose 'To use heuristics'. Finally, (10%) opted for the use of 'an algorithm'.

2/ How much do you care about the following procedures?(Put a cross (X) in the right box.)

Table 29

Teachers' Care about Problem Solving Procedures

Teacher's Procedures	A great deal	A lot	A moderate amount	A little	Not at all	No Answer
1/Setting problem solving tasks while teaching.	16 p (32%)	20 p (40%)	11 p (22%)	3 p (6%)	0 p (00%)	0 p (00%)
2/Explaining problem-solving strategies.	11p (22%)	17 p(34%)	16 p (32%)	3 p (6%)	1 p (2%)	2 p (4%)
3/Encouraging students to get involved in active problem solving.	22 p (44%)	18 p (36%)	6 p (12%)	0 p (00%)	0 p (00%)	4 p (8%)
4/ Showing my students the way to divide problems into sub-problems.	10 p (20%)	19 p (38%)	13 p (26%)	6 p (12%)	2 p (4%)	0p (00%)
5/Setting collaborative problem solving tasks.	20 p (40%)	18 p (36%)	8 p (16%)	3 p (6%)	0 p (00%)	1 p (2%)
6/Setting individual problem solving tasks.	4 p (8%)	20 p (40%)	15 p (30%)	7 p (14%)	2 p (4%)	2 p (4%)
7/Guiding students towards systematic problem solving.	8 p (16%)	14 p (28%)	12 p (24%)	9 p (18%)	4 p (8%)	3 p (6%)
8/ Setting problem solving tasks dealing with real world issues.	23 p (46%)	18 p (36%)	4 p (8%)	4 p (8%)	1 p (2%)	0p (00%)

Regarding the procedure 'Setting problem solving tasks while teaching' (32%) opted for 'a great deal', (40%) opted for 'a lot', (22%) opted for 'a moderate amount', (6%) opted for 'a little', (0%) opted for 'not at all', and (0%) chose 'no answer'.

As to the procedure 'Explaining problem-solving strategies'(22%) answered with A great deal, (34%) answered with 'a lot', (32%) chose 'a moderate amount', (6%) ticked 'a little', (2%) chose 'not at all', and (4%) did not answer.

As to the procedure 'Encouraging students to get involved in active problem solving' (44%) answered with 'a great deal', (36%) answered with 'a lot', (12%) chose 'a moderate amount', (0%) ticked 'a little', (0%) chose 'not at all', (8%) did not answer. As for the procedure 'Showing my students the way to divide problems into sub-problems' (20%) responded with 'a great deal', (38%) responded with 'a lot', (26%) opted 'a moderate amount', (12%) opted for 'a little', (4%) ticked 'not at all', and (0%) chose 'no answer'.

On the procedure 'Setting collaborative problem solving'(40%) selected 'a great deal', (36%) responded with 'a lot', (16%) ticked 'a moderate amount', (6%) chose 'a little', (0%) ticked 'not at all', and (2%) did not select any option.

On the procedure 'Setting individual problem solving tasks'(8%) selected 'a great deal', (40%) responded with 'a lot', (30%) ticked 'a moderate amount', (14%) chose 'a little', (4%) ticked 'not at all', and (4%) did not select any option.

About to the procedure 'Guiding students towards systematic problem solving'(16%) answered with 'a great deal', (28%) answered with 'a lot', (24%) chose 'a moderate amount', (18%) ticked 'a little', (8%) chose 'not at all', and (6%) did not answer. Individual problem solving should be stressed all along the teaching processes besides collaborative one. Individual problem solving reflects students' responsibility, learning styles,

multiple intelligence, creative, autonomy, self-reliance, self-confidence and strategic knowledge.

About the procedure ‘Setting problem solving tasks dealing with real world issues’ (46%) opted ‘a great deal’, (36%) selected ‘a lot’, (8%) responded with ‘a moderate amount’, (8%) selected ‘a little’, (2%) chose ‘not at all’, and (0%) did not tick any preposition.

Q3/ Would you specify the frequency you ask your students for the identification and understanding of problems before solving them?

Table 30
The Frequency of Asking Students to Identify and Understand Problems

The Frequency	The Number of Participants	The Percentage
Very often	22	44%
Often	11	22%
Regularly	15	30%
Rarely	2	4%
Never	00	00%

As to the frequency teachers ask their students to identify and understand problems before starting to solve them, (44%) opted for ‘very often’, (22%) ticked ‘often’, (30%) chose ‘regularly’, (4%) opted for ‘rarely’, and no respondent opted for “never”.

4/ How often do you implement each of the following? (Put a cross (X) in the right box.)

Table 31
Teachers’ Implementation of Problem Solving in the Classroom in Terms of Frequency

Teachers’ Practices I involve my students in:	Very often	Often	Regularly	Rarely	Never	No Answer
<i>Making predictions, drawing conclusions, and synthesis.</i>	9p (18%)	15p (30%)	15p (30%)	8p (16%)	0p (00%)	3p (6%)
<i>Evaluation of validity and importance of</i>	2p (4%)	12p (24%)	20p (40%)	9p (18%)	5p (10%)	2p (4%)

<i>arguments.</i>						
<i>Identification of marginal and core aspects of knowledge.</i>	2p (4%)	6p (12%)	10p (20%)	20p (40%)	6p (12%)	6p (12%)
<i>New knowledge representation through symbols.</i>	8p (16%)	6p (12%)	18p (36%)	17p (34%)	0p (00%)	1p (2%)
<i>Solving challenging issues stressing comparison and contrast.</i>	3p (6%)	8p (16%)	13p (26%)	17p (34%)	7p (14%)	2p (4%)
<i>Critical explanation of identical aspects of things.</i>	14p (28%)	12p (24%)	16p (32%)	5p (10%)	0p (00%)	3p (6%)
<i>Knowledge classification in a justifiable way.</i>	7p (14%)	9p (18%)	15p (30%)	12p (24%)	1p (2%)	6p (12%)
<i>Assessment of the validity of information with justifications</i>	10p (20%)	17p (34%)	12p (24%)	7p (14%)	3p (6%)	1p (2%)
<i>Evaluating conclusions.</i>	9p (18%)	13p (26%)	22p (44%)	4p (8%)	2p (4%)	0p (00%)
<i>. Construction and explanation of novel generalizations of knowledge.</i>	6p (12%)	19p (38%)	16p (32%)	7p (14%)	0p (00%)	2p (4%)
<i>Identification of novel language rules application.</i>	10p (20%)	17p (34%)	15p (30%)	4p (8%)	1p (2%)	3p (6%)

Remark: In the table the letter ‘p’ stands for participant

Table 31 displays the findings about teachers’ implementation of problem solving in the classroom in terms of frequency. First of all, as to the task ‘*Making predictions, drawing conclusions, and synthesis*’(18%) chose ‘very often’, (30%) chose ‘often’, (30%) opted for ‘regularly’, (16%) chose ‘rarely’, (0%) of the teachers selected ‘never’, and finally (6%) provided no answer. Second, the respondents’ answers regarding the task ‘*Evaluation of validity and importance of arguments*’ are: (4%) chose Very often, (24%) chose often, (40%) opted for regularly, (18%) chose rarely, (10%) selected never, and finally (4%) provided no answer. Third, the informants view the task ‘*Critical explanation of identical aspects of things*’,(28%) opted for ‘very often’, (24%)selected often, (32%) chose regularly, (10%) chose ‘rarely’, (00%) ticked never, and (6%) of the informants did not tick any suggestion.

In addition, as for the task *'Knowledge classification in a justifiable way'*, the teachers answered with: (14%) opted for 'very often', (18%) opted for 'often', (30%) selected regularly, (24%) selected 'rarely', (2%) opted for never, and finally (12%) provided no answer. Besides, on the task *'Assessment of the validity of information with justifications'*, the teachers answers include: (20%) answered with 'very often', (34%) answered with 'often', (44%) responded with 'regularly', (14%) opted for rarely, (6%) chose 'never', and finally (2%) gave no answer. Moreover, as to the task *'Evaluating conclusions'*, the respondents' views were: (38%) responded with 'very often', (26%) responded with 'often', (24%) responded with 'regularly', (8%) selected 'rarely', (4%) chose 'never', and finally (0%) provided no answer. Furthermore, regarding the task *'Construction and explanation of novel generalizations of knowledge.'*, the teachers' claims were: (12%) chose 'Very often', (18%) chose 'often', (32%) chose 'regularly', (14%) opted for 'rarely', (0%) chose 'never', and (4%) did not suggest any answer. On the task *'Identification of novel language rules application'*, the teachers answered with: (20%) selected 'very often', (34%) chose 'often', (30%) selected 'regularly', (8%) responded with 'rarely', (2%) chose 'never', and (6%) did not select any suggestion.

V-2- Discussion of the Results of the Questionnaire

IV-2- 1- Section One: General Information about the Respondents

In this section, participants' working experience, their training, and academic degree will be discussed.

V-2-1-1-Participants' Working Experience

Regarding the teachers' working experience (See Appendix 2, Section One, Q 1), the data gathered suggest that the respondents' teaching experiences vary. Indeed, 8 of them (16%) claimed that they had been teaching for less than 5 years. Another percentage (32%) of the teachers mentioned that their work experience stretched from 5 to 10 years. Finally, the

bigger ratio of the participants (52%) opted in their answers for more than a ten-year work experience.

It can be inferred from the findings that the majority of the participants have more than a ten- year experience. Basically, the teachers could be said to have the skills for effective teaching in general, and for problem solving in particular. In addition, the teachers' answers could be viewed as signals of their implicit pedagogical awareness of the crucial role of problem solving in the classroom. This remains, however, a suggestion that requires a field study to collect data about the effectiveness of teachers' practices regarding problem solving. In this context, it should be mentioned that efficiency in teaching is not automatically only determined by experience. Other factors are to be highlighted, mainly communicative skills, cognitive skills, behavioral skills, and assessment literacy (See Day, 1999; Richards & Farrell, 2005).

The different emerging roles and responsibilities that are implicitly associated with EFL teachers' experience can be assembled in their duty to teach students individual and collaborative problem solving effectively. This can take place by allowing students to approach new problem situations that require recourse to higher-cognitive skills. For so doing, teachers' guidance and their management techniques are crucial (See Jonassen, 2004, 2011).

V-2-1-2- Teachers' Training

A deep analysis of the findings obtained regarding the issue of teachers' training (See Appendix 2, Section One, Q 2) indicates that almost all the teachers (64%) received training. This can be qualified as a positive point following the principle that practice makes perfect. Additionally, training could be highly supportive for teachers to get clear insights into the aspects of their teaching practices that they should improve. The idea is that training represents an opportunity for self-criticism and self-evaluation on the basis of which effective decisions regarding adjustments of the teaching practices could be made. A training period,

even short, allows the teachers to become more aware of their responsibility to continuously make more efforts to reach expertise and professionalism.

In the field of problem-solving, training might inform the teachers about the principles of effective knowledge construction through the resolution of new problems. At this stage, some teachers received training regarding teaching methods like CBLT during seminars. On the crucial role of training for teachers' improvements, Richards and Farrell (2005) highlight that training is extremely important for teachers' long-term development.

On the basis of what has been said regarding teachers' training, it can be claimed that the majority of the teachers, thanks to the training they received, could be said to have awareness, at least average, of the important role of problem solving in teaching and learning. Subsequently, their roles and responsibilities should be oriented to the creation of an atmosphere conducive to effective teaching and assessment of problem solving through tasks that tap complex cognitive processes.

V-2-1-3- Teachers' Academic Degree

The results (See Appendix 2, Section One, Q 3) suggest that the majority of the teachers (78%) had a Bachelor degree, and (20%) of them had a Master degree, and the Magister degree was held by one teacher only. Finally, none of the informants had a Doctorate degree. Academic degrees, speaking, connotes intellectual achievement and level. They allow individuals to have access to official institutions for education and teaching. In the context of the present study, it can be inferred from the findings that the teachers' degree, be it Bachelor, Master, or Magister, is enough for ensuring EFL quality teaching in the Algerian Secondary Schools Exam classes. Nevertheless, the 'complexity' and 'unpredictability' of teaching necessitate the use of best teaching methods and techniques to allow the students become effective problem solvers. This, of course, requires time and a motivating educational setting that conglomerate facilitative strategies for meaningful levels of performance.

Academic degrees should always be viewed as visas to get access to training centers. The idea is that degrees should be backed by training, resilience, perseverance, and self-criticism. In this vein, Day (1999) estimates that for teachers to succeed in their job qualifications are not enough in that stress should also be put on the updating of subject knowledge, as well as teaching techniques and practices. This implies that the coalescence of effective training and mastery of the subject matter represent the basis for effective teaching. In addition, when involved in learning as reflective practice teachers proceed to information collection to critically reflect on their own practices stressing strategies such as self observation, self monitoring, and case studies (Richards & Farrell, 2005).

Like experience and training, an academic degree represents another qualification that might be an indicator of the awareness the teachers have about the significance of problem solving. Accordingly, the degrees call on the teachers to strive to help their students become effective problem solvers as part of their responsibilities.

V-2- 2- Section Two: Teachers' Views about the Implementation of Problem Solving in the Classroom

In this section, focus is on the discussion of the teachers' views about the difficulty of implementing problem solving in the classroom, and the link between effective instruction and effective problem solving. Besides, the section treats the necessity to stress the assessment of students to solve new problems, the importance of guiding students to develop positive attitudes towards solving novel and complex problems, as well as the benefits of implementing problem solving in the classroom.

V-2-2- 1-Teachers' Views about the Difficulty of Implementing Problem Solving in the Classroom

An analysis of the findings (See Table 23) indicates that the multiple perspectives offered by the teachers on the difficulty of implementing problem solving in the classroom are signs that teachers are still struggling to overcome the various obstacles that render

challenging the teaching of problem solving as a highly valuable academic endeavor. Of the 50 respondents, only three (6%) view the implementation of problem solving 'easy'. In this context, Ansarian and Mei Lin (2018) explain that a decade after its introduction in Canada, PBL spread into many areas, although the humanities and social sciences were among the last to adopt it. Its adoption was much harsher in the case of language instruction because acquiring a language as an end and means would complicate the learning environment.

Interestingly, Lubart and Mouchiroud estimate (2003) that creativity might be a hindrance to issue solving because certain situations call for unique solutions, which are not always simple to come up with. They call for a combination of 'conative' and cognitive abilities during the problem-solving process. In other words, allowing the students to become creative problem solvers is a very demanding task. Additionally, Ansarian and Mei Lin (2018) articulate that starting the instructional process through problem implementation might be difficult for language teachers. This is basically due to the fact that the instructional objectives in language teaching are generally already set and opting for PBL could lead to lesson objectives deviation. This suggests that formal education hinders teachers' flexibility to adopt problem solving methods that do not fit the teaching objectives set by the educational institutions they work for.

In most traditional approaches to education, teachers are 'the sage on the stage,' they are responsible for conducting the classroom orchestra, providing students with correct answers, and guiding the classroom tasks. This well-entrenched notion of the teacher's role in class has made the shift to PBL difficult (Ansarian & Mei Lin, 2018, p.42). Moreover, Apple's (2008) estimates that making durable changes in the policies and strategies of educational programs is a highly challenging task (as cited in Ansarian & Mei Lin, 2018).

The teachers' answers on the difficulty of implementing problem solving in the classroom illustrate another crucial aspect that tells much about the teachers' awareness and

their roles and responsibilities regarding problem solving. Indeed, the awareness that the teachers possess about the issue could enlighten them about their roles and responsibilities in considering the sources of the obstacles that render difficult the teaching of problem solving and, subsequently, reflect on potential solutions. At this stage, teachers, for instance, could review the key approaches and strategies to be used in problems solving. The idea has to do with ‘subject-matter knowledge’ incorporating the basic knowledge of TESOL such as grammatical and discourse competence, knowledge about phonology, second language acquisition and language testing, methodological knowledge, knowledge about curriculum design, and other aspects that are inherent to professional knowledge necessary for effective language teaching (Richards & Farrell, 2010).

More importantly, being aware of the difficulty of implementing problem solving in the classroom requires teachers to closely look at their students’ learning styles, needs, cognitive abilities, as well as their multiple intelligences. The point revolves around ‘understanding of learners’, meaning getting involved in profound comprehension of the learners’ learning difficulties and problems, their styles of acquiring knowledge, and the teaching practices that support learners to have access to the to-be learned content (Richards & Farrell, 2010).

Additionally, Mahn and John-Steiner (2002) articulate “A teacher’s awareness of students’ ways of perceiving, processing and reacting to classroom interactions – their **perezhivaniya**– contributes significantly to the teacher’s ability to engage the students in meaningful, engaging education”(p. 53). In brief, for teachers to be effective, it is not enough to limit themselves for knowledge transmission and assessment, they also should be effective problem solvers able to face the merging difficulties within the classroom.

V-2-2- 2-Teachers' Views about the Link between Effective Instruction and Effective Problem Solving

Although the original question was directly asked for teachers' views rather than their level of awareness (See Appendix 2, Section Two, Q 2), the responses still reflect an implicit awareness the teachers hold about the link between effective instruction and effective problem solving. In fact, 16 (32%) teachers strongly agreed on the point and 25 (50%) of them agreed.

Effective instruction is meant to facilitate high quality achievements in terms of the three types of knowledge: 'know-what', 'know-how-to do', and 'know-how to be', or using another terminology referring respectively to 'content', 'skills' and 'attitudes'. Problem solving involves the three types of knowledge. The idea is that problem solving is an indissociable part from effective instruction. In this context, Ansarian and Mei Lin (2018) explain that owing to the fact that discussions are at the center of PBL, it (PBL) has the ability to improve language acquisition through the multiple opportunities to utilize the target language, its inventive and collaborative nature makes it an ideal teaching method for language classrooms. Furthermore, its focus on using real-world problems as teaching scenarios may increase students' enthusiasm to learn and promote language acquisition in the classroom.

Teachers' awareness of the link between problem solving and effective instruction could be viewed as an indicator of their pedagogical knowledge. Being aware of the issue, the teachers become responsible for articulating their roles regarding the implementation of tasks that foster high achievements in problem solving. The significance of this becomes clearer by making reference to Goodman (2008) who asserts that problem-based learning favors active learning. Therefore, teachers' roles and responsibilities are to be directed towards the involvement of students in the resolution of complex and new tasks individually and collaboratively. Achieving such goals goes hand in hand with the mastery of the key problem-

solving strategies, as well as with the understanding of the cognitive skills involved in complex and creative problem solving using taxonomies like (Bloom's Taxonomy, 1956; Quellmalz's Taxonomy, 1988; and Marzano's Taxonomy, 2001)

V-2-2- 3-Teachers' Views about the Necessity to Assess Learners to Solve New Problems

On the issue of assessing learners to solve new problems, the informants provided positive answers and views (Table 25). Indeed, (42%) strongly agreed, (50%) agreed, (6%) partly agreed, and one teacher (2%) disagreed. Ansarian and Mei Lin (2018), in this regard, explain that it is the responsibility of language learners to solve new problems, come up with solutions, examine the available data, and adapt their conclusions to novel circumstances. For this reason, language learners ought to be self-sufficient and capable of handling these tasks responsibly. In addition, Lewis and Smith (1993) argue that problem solving requires the use of higher-thinking skills to combine new information with the old one in the resolution of complex issues.

Ansarian and Mei Lin (2018) suggest that the assessment and evaluation of the novel knowledge are to be done through the reflection component of the PBL approach. In addition, according to Jonassen (2011), learning to solve problems is aided by asking questions to guide student analysis. Transfer of the skill of questioning occurs when students become able to generate explanatory questions on their own when presented with new problems.

Teachers' awareness of the necessity to assess learners to solve new problems underlines their duty to stress deep thinking and complex problem solving in their teaching practices. Said differently, the complexity of real-life situations joined with the basic goals of life-long learning underscore the teachers' roles and responsibilities for allowing the students' to go beyond routine knowledge construction to reach newness and creativity by undertaking

new problems. In this vein, Dalton and Tharp (2000, p. 189) recommend teachers to design learning tasks that boost students' understanding towards highly complex stages of understanding. Solving new problems can be viewed as a coalescence of students' risk taking (Shaftel & Shaftel, 1966) and teachers' flexibility (Spiro et al, 1988).

V-2-2- 4-The Importance of Helping Students Solve New Problems

On the importance of helping students to solve new problems, the teachers provided the following answers (See Table 26): (68%) of respondents answered with 'very important', (30%) answered with 'important', (2%) opted for 'somewhat important', and no respondent opted for 'not important.' This clearly reflects the implicit teachers' awareness of the issue. Teachers' guidance of their students during the teaching learning process is a crucial supportive means that enlightens the students on the right actions to take and the relevant decisions to make to improve their performance. Students need their teachers' support for the sake of becoming more confident both psychologically and pedagogically. This can be concretized by stressing problem-based learning as Duch et al. (2001) observe that PBL aims at enabling students to get involved in critical thinking and analysis and resolution of complex and real-life problems.

In the context of helping students to solve new problems, teachers could make recourse to the various problem solving models (Polya, 1967, Sternberg, 1988, Bransford & Stein, 1983), as well as to problem typology (Robertson, 2001; Reed, 2007). Furthermore, teachers could guide students to stress the methods of good problem solvers: 'positive attitude', 'concern for accuracy', 'breaking the problem into parts' 'avoidance of guessing', and 'activeness in problem solving' (Whimbey & Lochhead, 1999, pp. 25-27).

Teachers' guidance of their students is one of the key principles of constructivism (Vygotsky, 1978, Bruner, 1996; Pritchard, 2009). Teachers' awareness of the importance of helping students to solve new problems tapes into their roles and responsibilities to establish a

kind of balance between their guidance and students' autonomy. It is of the teachers' tasks to guide the students to solve new problems in a principled way leaving that room of risk-taking and deep thinking to the students. In this regard, Dalton and Tharp (2002) recommend teachers to assist "students to accomplish more complex understanding by relating to their real-life experience" (p. 189). This reflects the way background knowledge sustains advanced learning.

V-2-2- 5-The Benefits of Implementing Problem Solving in the Classroom

Of all the respondents, except four (8%) of them did not provide any view regarding the benefits of implementing problem solving in the classroom (See Table 27). In this vein, the respondents mentioned a range of advantages of implementing problem-solving tasks. Indeed, they mentioned: problem identification and understanding, independent learners, self expression, effective citizens, developing the students' thinking skills in terms of criticality, creativity, analysis, and inference, developing the students' communication skills, developing the students' self-confidence and autonomy. In addition, the teachers mentioned time saving, the development of students' self-management and responsibility, reactivating of acquired knowledge, developing social skills, developing thinking and learning strategies, preparing learners to face real-life problems using particular strategies, raising students' awareness about problem solving, as well as improving the teaching learning situations.

Teachers' perception of the benefits of problem solving is tightly linked to their awareness. Indeed, acknowledging the benefits of problem solving, teachers reveal that they recognize its value in the educational process. This acknowledgement can serve as an indicator of their awareness. In this context, Day (1999) sustains that "expert teachers are those who retain their ability to be self-conscious about their teaching and are constantly aware of the learning possibilities inherent in each teaching episode and individual interaction"(p., 53).

The respondents' answers can be illustrated by referring to their sayings. For example, one respondent answered: *"It is important to realize that being a problem solver is not just an ability; it is a whole mind set. It helps to solve different problems challenging their school business, creating more opportunities for them from real-life situations rather just in the classroom."* Another respondent reported *"The learners will be self-reliant and autonomous, they can face difficult situations with strong self-confidence."* In addition, another teacher mentioned *"It addresses real-life issues that require real-life solutions that can be used or exploited outside the classroom. It also enables learners to re-invest the resources in terms of the 'knows' and 'how to do'. Besides, it is a good opportunity to use cross-curricular competencies and more importantly learners become autonomous."* Moreover, one of the respondent provided this view about the benefits of implementing problem solving in the classroom: *"It provides students with opportunities to use their newly acquired knowledge in real-life activities. It encourages students to believe in their ability to think about the solution. They will see that they can apply what they learned to find the solution to a problem."*

Teachers' awareness of the benefits of implementing problem solving in the classroom indicate that their answers rest on three axes: (1) benefits that concern the students, (2) benefits that concern the teachers, and (3) benefits that regard the teaching learning situation. Awareness of all these benefits suggests that teachers would make more efforts in taking their responsibilities and roles for the sake of the concretization of the benefits. At this stage, it is assumed that the teachers provide their students to experiment and try out new problem solving approaches when handling novel and ill-structured language issues (See Pretz et al., 2003; Robertson, 2001). More importantly, teachers are expected to delve into effective assessment of their students' problem solving skills. In this context, it is worthwhile to refer to Wells and Claxton (2002) who clarify that the class is also 'a community' in which teachers can organize tasks, teach, and sustain the development of individual students. In

short, the teacher's basic role and responsibility remains forever the enhancement of students' achievement in terms of content, skills, and attitudes.

V-2- 3- Section Three: Teachers' Views about the Teaching of Problem Solving Strategies and Procedures

Through this section of the questionnaire stress is on the discussion of the results regarding teachers' views about the strategies that fit(s) best problem-solving. In addition, emphasis is on the analysis of the teachers' care about problem solving procedures, as well as the frequency teachers ask students for the identification and understanding of problems before solving them.

V-2- 3-1- Teachers' Views about the Best Strategies of Problem-Solving

As regards the teachers' views about the best strategies they think fit(s) best problem-solving (See Table 28), the results show that (67.64%) of the teachers opted for 'the use of analogical problem solving' and 'Setting objectives as solutions and searching for the means leading there.' '. In addition, (6%) of the respondents chose 'general problem solving rules like heuristics'. Finally, (10%) opted for the use of 'algorithms'. An analysis of these findings allows inferring that teachers preferred analogical problem solving. The latter is applied in cases new problems have similarities with the previously solved ones. In this vein, Jonassen (2011) explains that "the goal of analogical problem solving is the extraction from analogous (source) case(s) the conceptual structure of the problem and the application of that structure to a new problem" (p. 266).

The analysis of the teachers' views about the best strategies they think fit(s) best problem-solving signal a kind of awareness regarding the importance of analogical problem solving, but not of heuristics (6%) and algorithms (10%). At this stage, the teachers' responsibilities and roles should be oriented to the consideration of heuristics in problem solving, as well as algorithms. It is true that analogical problem solving is fundamental in problem solving. This is in line with what Affandy et al. (2024) have found that the

integration of creative pedagogy into problem based learning improves the students' abilities to reach critical analysis, evaluation and produce creative solutions to complex problems. It is, nonetheless, indispensable to mainly give the students the chance to work out and try problem solving using heuristics (Gross & McDonald, 1958; De Corte, 1990; Schunk, 2012).

V-2- 3-2- Teachers' Care about Problem-Solving Procedures

Here the focus is on teachers' care about problem-solving. Regarding the procedure 'Setting problem solving tasks while teaching', (32%) opted for 'A great deal', (40%) opted for 'A lot', (22%) opted for 'A moderate amount', (6%) opted for 'A little', and (0%) opted for 'not at all', (0%) provided no answer. When teachers organise the teaching/learning process around problem solving tasks, they set a climate that invites the students to think deeply and analytically. Problem solving tasks can be viewed as tools that challenge the students to take risks and initiatives all along the problem solving journey. In this context, "the problem forms the core of PBL, and it triggers inquiry and requires the students to employ a variety of resources to solve it" (Hmelo-silver, 2004; as cited in Ansarian & Mei Lin, 2018, p.15).

In addition, Ansarian and Mei Lin (2018) articulate that the use of well-defined learning tasks determines successful collaboration in PBL classrooms. By setting tasks by language tutors, the students will get involved in problem exploration, hypotheses creation, elaboration and identification of issues. To reach such an aim, students are required to be aware and know their previous knowledge and the new one they desire to acquire. In such a case, Flavell (1987) estimates that learners can classify their instructional needs in terms of priority, set instructional objectives, and design resources for learning (as cited in Jonassen, 2011, p. 340). More importantly, "metacognitive knowledge includes knowledge of the skills required by different tasks, strategic knowledge (knowledge of alternative learning strategies

and when to use them) and self-knowledge (knowledge of one's abilities and the abilities of others)" (Flavell, 1987; as cited in Jonassen, 2011, p. 340)

As to the procedure 'Explaining problem-solving strategies', (22%) answered with A great deal, (34%) answered with 'A lot', (32%) chose 'A moderate amount', (6%) ticked A little, (2%) chose 'not at all', (4%) did not answer. When teachers sustain their students to understand and develop problem solving strategies, the students' autonomy, high cognitive skills, and their methodological skills are likely to improve. More importantly, students' decision making would become more sophisticated thanks to their involvement in selection and evaluation of information and alternatives.

As to the procedure 'Encouraging students to get involved in active problem solving', (44%) answered with A great deal, (36%) answered with 'A lot', (12%) chose 'A moderate amount', (0%) ticked A little, (0%) chose 'not at all', and (8%) did not answer. Teachers' motivation of their students to solve problems actively and accurately is a determinant teaching practice and aspect that greatly impacts students' involvement in acquiring and doing what renders them life-long learners. In this vein, Jonassen, (2011) clarifies that students' motivation is crucial in problem solving in that it determines their readiness and desire to get involved in resolving problem-solving tasks. Additionally, "posing problems relevant to the students' real-life context increases their motivation levels as they are more likely to value what they are learning" (Ansarian & Mei Lin , 2018, p.5).

As for the procedure 'Showing my students the way to divide problems into sub-problems', (20%) responded with 'A great deal', (38%) responded with 'A lot', (26%) opted 'A moderate amount', (12%) opted for 'A little', (4%) ticked 'not at all', (0%) did not chose any suggestion. Successful problem solving fundamentally rests on problem analysis and this by to divide problems into sub problems. In this regard, Whitten and Graesser (2003) argue "The organization of the text into labeled goals and subgoals has been

shown to facilitate problem solving” (p. 213). Furthermore, Zimmerman and Campillo (2003) advise that students need to be sustained to reach hierarchically-set sub-goals in problem solving so that to become more motivated to attain the main goals in solving problems by stressing self-evaluation and their mastery of the sub-goals.

The findings obtained regarding procedure ‘Setting collaborative problem solving tasks’,(40%) selected ‘A great deal’, (36%) responded with ‘A lot’, (16%) ticked ‘A moderate amount’, (6%) chose ‘A little’, (0%) ticked ‘not at all’, (2%) did not select any option. Collaborative problem solving is a positive aspect of teaching that reflects the principles of constructivism. Collaboration allows the students to exchange their ideas in communicative situations. In addition, collaboration creates a kind of enthusiasm in the classroom, something that keeps the students from becoming bored. Collaborative problem solving renders the students responsible regarding the ways to behave and respect each other; it is efficient for developing social skills. In this vein, it should be mentioned that “problem creation, self-directed learning, collaboration, facilitation, reflection, and integration are among the most significant characteristics of PBL” (Ansarian & Mei Lin, 2018, p. 23). In addition, it is to be highlighted that “In the PBL approach, students are expected to take the lead in their own learning by evaluating and solving the problem through collaboration with their group members” (Utrecht, 2003; as cited in Ansarian & Mei Lin, 2018, p. 43).

On the procedure ‘Setting individual problem solving tasks’,(8%) selected ‘A great deal’, (40%) responded with ‘A lot’, (30%) ticked ‘A moderate amount’, (14%) chose ‘A little’, (4%) ticked ‘not at all’, (4%) did not select any option. Individual problem solving should be stressed all along the teaching processes besides collaborative one. Individual problem solving reflects students’ responsibility, learning styles, multiple intelligence, creative, autonomy, self-reliance, self confidence and strategic knowledge.

About to the procedure ‘Guiding students towards systematic problem solving’, (16%) answered with A great deal, (28%) answered with A lot, (24%) chose A moderate amount, (18%) ticked A little, (8%) chose not at all, (6%) did not answer. Systematic problem solving reflects a kind of mastery of the three types of knowledge: ‘content’, ‘skills’ and ‘attitudes’. In their journey of solving problems, the students have to make reference to a set of standards so that to build a system on which to make decisions regarding the data to be included in the problem solving process and the alternatives to generate and select.

About the procedure ‘Setting problem solving tasks dealing with real world issues’, (46%) opted ‘A great deal’, (36%) selected ‘A lot’, (8%) responded with ‘A moderate amount’, (8%) selected ‘A little’, (2%) chose ‘not at all’, and (0%) did not tick any preposition. Knowledge acquisition should exceed the borders of classrooms to reach real-life situations. Students need to be taught in such a way that prepare them to become effective citizens capable of handling real-life problems using their ‘know what’, ‘know how to do’ and ‘know how to be’. In this vein, Ansarian and Mei Lin (2018) explain that in PBL, problems should mirror world-like situations and that the students’ understanding of problems should be emphasised. Additionally, students become more motivated to handle problem solving when they are exposed to the resolution of real-world like problems as this allows them to see the significance of knowledge to which they are exposed (Ansarian & Mei Lin, 2018). Moreover, it should be indicated that PBL puts emphasis on open-ended problems that render the teaching learning environment more authentic (Jonassen & Hung, 2008; as cited in Ansarian & Mei Lin, 2018)

Teachers’ care and awareness of the problem-solving procedures mentioned previously suggest that the teachers assume their roles and responsibilities fully for the implementation of a theory-constructed or strategic problem solving in the classroom. Subsequently, classroom interactions between students and teachers, on the one hand, and

intense creative collaborations among students, on the other, might seem to be a relevant and appropriate environment in which strategic problem solving could be successfully implemented.

V-2- 3-3- The Frequency of Asking Students to Identify and Understand Problems

As regards the frequency of asking students to identify and understand problems before solving them (See Table 30), the findings suggest that (44%) opted for ‘very often’ (22%) ticked ‘often’, (30%) chose ‘regularly’, (4%) opted for ‘rarely’, and no respondent opted for “never”. This shows that almost all the teachers care about the principle of guiding students’ towards problem identification and comprehension before solution generation. The assertion that can be drawn from this is that the respondents manifested and explicit awareness of necessity of identifying and understanding problems as vital steps towards goal attainment. This corroborates with ideas and principles of Polya (1962), Bransford and Stein (1993), and Sternberg (1999). On the basis of this, the teachers’ emerging roles and responsibilities should be oriented towards encouraging students to develop consistent habits regarding problem identification and comprehension.

V-2- 3-4-Teachers’ Implementation of Problem Solving Tasks in the Classroom

The teachers’ claims (See Table 31) regarding their involvement of the students in problem solving tasks in the classroom, in most cases, turn around the frequencies: ‘very often’, ‘often’, and ‘regularly’. That is to say, the answers signal the teachers’ awareness of the importance of problem solving. Nevertheless, the claims need to be followed by observations so that to ascertain whether they are valid or invalid. Assuming that the teachers’ claims are valid, they, accordingly, reflect a very positive aspect of the teachers’ practices regarding the issue of problem solving implementation in the classroom.

The results obtained regarding the teachers' involvement of their students in '*the generation and analysis of new alternatives*', suggest: (16%) opted for 'Very often', (64%) opted for 'often', (24%) opted for 'regularly', (8%) opted for 'rarely', (2%) opted for 'never', and finally (4%) provided no answer. This means that the teachers assign their students tasks that revolve around open-ended questions to which students can generate a wide range of varied and novel answers. It can, thus, be inferred from the teachers' claims that the students are often or regularly encouraged to consider problems from different angles. This is explicitly linked to divergent thinking, creativity, and productive thinking. For example, in this context, Lubart and Mouchiroud, (2003) articulate "in the creative process people must generate new, alternative solutions that involve divergent and convergent thinking. In routine problem solving, people apply previously acquired procedures, search for ready-made solutions, and tend to satisfice, all of which involve mainly convergent thinking" (p. 138).

As to the students' engagement by their teachers in the tasks: '*making predictions, drawing conclusions, and synthesis*', the findings indicate that (18%) of the teachers chose Very often, (30%) of them chose 'often', (30%) opted for 'regularly', (16%) chose 'rarely', (0%) selected 'never', and finally (6%) of the teachers provided no answer. An examination of the options suggests that the processes '*making predictions, drawing conclusions, and synthesis*' that belong to the 'Analysis' level in Marzano's Taxonomy are stressed by the teachers.

The findings regarding the teachers' claims that they involve their students in '*Evaluation of validity and importance of arguments*' show: (4%) chose 'Very often', (24%) chose 'often', (40%) opted for 'regularly', (18%) chose 'rarely', (10%) selected 'never', and finally (4%) provided no answer. In this context, Marzano (2007) highlights "Analyzing involves five mental processes: matching, classifying, analyzing errors, generalizing, and

specifying. The protocols for matching and classifying are similar in that they rely on the identification and analysis of characteristics” (p. 153). It is to be indicated that all the remaining tasks belong to ‘Analysis’.

As far as the *‘Identification of marginal and core aspects of knowledge’* the participants answers are as follows: (4%) ticked ‘Very often’, (12%) selected ‘often’, (20%) responded with ‘regularly’, (40%) chose rarely, (12%) ticked ‘never’, and (12%) did not answer. The students by doing that they ought to evaluate following a set of standards regarding features of knowledge. This aspect deals with critical thinking and it is crucial for effective problem solving.

About the task *‘New knowledge representation through symbols’*, the views that were gathered are: (16%) selected Very often, (12%) selected ‘often’, (36%) selected regularly, (34%) responded with rarely, (0%) chose ‘never’, and (2%) of the teachers did respond. At this stage, the students can represent the information relative to the to-be solved problem using symbols. Such a way of communication represents variety in learning.

The views the teachers provided regarding the task *‘Solving challenging issues stressing comparison and contrast’* are: (16%) answered with ‘Very often’, (16%) responded with ‘often’, (26%) answered with ‘regularly’, (34%) selected ‘rarely’, (14%) selected ‘never’, and (4%) did not answer. This task relates to analysis in Marzano’s taxonomy. The students’ abilities to do difficult tasks in a contrastive way require them to analyse parts of knowledge critically by explaining the similarities and differences between various knowledge components. This keeps students out of mechanical and routine learning. This corroborates with Schunk’s (2012) principle in that he excludes from problem solving solutions that are generated in an automatic and mechanical way.

The informants view the task *‘Critical explanation of identical aspects of things’* in different ways, (28%) opted for ‘Very often’, (24%) selected ‘often’, (32%) chose regularly,

(10%) 'chose rarely', (00%) ticked 'never', and (6%) of the informants did not tick any suggestion. This task, too, has to do with contrast and comparison in a critical way.

As for the task '*Knowledge classification in a justifiable way*', the teachers answered with: (14%) opted for 'Very often', (18%) opted for 'often', (30%) selected 'regularly', (24%) selected rarely, (2%) opted for 'never', and finally (12%) provided no answer. Students' abilities to classify things into categories are fundamental in problem solving. This has to do with effective selection of information and alternatives that will be used during the problem solving process. This skill has to do with analysis in Marzano's taxonomy. Additionally, in this vein Mayer and Wittrock (2009) highlight that problem resolution rests on creative and critical thinking in that the former allows for hypotheses generation, whereas the second helps evaluating them.

On the task '*Assessment of the validity of information with justifications*', the teachers answers include: (20%) answered with 'Very often', (34%) answered with 'often', (24%) responded with 'regularly', (14%) opted for 'rarely', (6%) chose 'never', and finally (2%) gave no answer. The cognitive level that is involved in doing such a task is analysis in Marzano's taxonomy. The students are required to display a certain kind of critical reasoning improvising evidence about the validity or invalidity of information to use in generating solutions to problems. At this stage metacognition is crucial. Indeed, Tobias and Everson, 2009 insists on the role of metacognition in problem solving in that students' thinking should be stressed.

On the task '*Evaluating conclusion*', the respondents' views were: (18%) responded with 'Very often', (26%) responded with 'often', (44%) responded with 'regularly', (8%) selected 'rarely', (4%) chose 'never', and finally (0%) provided no answer. This is related to the analysis level in which evaluation and critical thinking are included. This should always take place relying on valid and objective standards and criteria.

Regarding the task *‘Construction and explanation of novel generalizations of knowledge’*, the teachers’ claims were: (12%) chose ‘Very often’, (38%) chose ‘often’, (32%) chose regularly, (14%) opted for ‘rarely’, (0%) chose ‘never’, and (4%) did not suggest any answer. This task has to do with analysis in Marzano’s taxonomy. The students’ involvement in constructing and explaining new generalizations of what they learned is to be oriented by teachers stressing the students’ learning styles and intelligences.

On the task *‘Identification of novel language rules application’*, the teachers’ answers were: (20%) selected ‘Very often’, (34%) chose ‘often’, (30%) selected ‘regularly’, (8%) responded with ‘rarely’, (2%) chose ‘never’, and (6%) did not select any suggestion. The cognitive skill involved at this stage is ‘specifying’ in Marzano’s taxonomy. By so doing, the students demonstrate their knowledge regarding the relevant actions to take in case of applying rules and principles in new problem situations.

As far as the task *‘Demonstrating effective communication skills-both verbal and written - in various ways’* is concerned, the teachers: (28%) chose ‘Very often’, (38%) selected often, (26%) ticked ‘regularly’, (8%) ticked ‘rarely’, (0%) opted for ‘never’, and (0%) did not respond. This is a principle that is found in collaborative problem solving. The importance of communication in problem solving lies in the fact of providing the students with opportunities in which they can develop their cognitive skills, their psychological state, and their social skills (Delisle, 1997; Trilling & Fadel, 2009).

Teachers’ claims about their implementation of problem solving tasks in the classroom reflect their awareness of what constitutes pivotal aspects and features of problem solving in terms of tasks. The teachers mentioned in their answers that they mostly stress the ‘analysis’ level in Marzano’s taxonomy. The tasks the teachers opted for in their answers gravitate more towards higher-order thinking skills than to lower ones. Such analysis could be backed by making recourse to Gipps (2002) who explains that for enabling students to reach higher

levels knowledge acquisition testing should go beyond discrete point items through standardized short answers to stress performance assessment through projects to be done both individually and in groups. In a nutshell, the teachers' responses represent a kind of engagement that requires them to involve their students in tasks that allow them to experience the principles of constructivism and life-long learning.

Conclusion

The chapter sought to figure out the extent to which the EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom, as well as the different emerging roles and responsibilities associated with the teachers' views towards problem solving. To reach such an aim the analysis was done relying on thematic analysis, Marzano's Taxonomy, and key principles about problem solving. The respondents' answers revealed that they were aware of the importance of problem solving in the teaching learning process and this to some extent. In addition, it was inferred from the findings that a set of emerging roles and responsibilities associated with the teachers' views towards problem solving including: the teachers' roles and responsibilities to design their students problem solving tasks that mirror real-life situations, the teachers roles to stress higher-order thinking skills by assigning their students tasks that turn around complex problem solving, the teachers roles and responsibilities to help their students in solving new and challenging problems. Moreover, the analysis has shown the teachers' roles and responsibilities in giving their students the chance to solve problems systematically and strategically.

It follows from what has been explained and discussed that the second research question: To what extent do the EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom? Can be answered stating that EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom to some extent. Furthermore, the answer to the third research question: What are the different

emerging roles and responsibilities to be associated with EFL teachers' views towards problem solving? It is to be stated as follows: The different emerging roles and responsibilities to be associated with EFL teachers' views towards problem solving include: the enhancement of the students' learning and the teaching practices

Subsequently, the second hypothesis: **The EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom to a lesser extent** has been rejected. Besides, the third hypothesis: **The different emerging roles and responsibilities to be associated with EFL teachers' views towards problem solving include: the enhancement of the students' learning and the teaching practices** has been confirmed.

Chapter Six: Sharpening Students' Complex Problem Solving Skills through Cognitive Flexibility: An Evaluation of the Algerian EFL Baccalaureate Examinations

Introduction

Students' learning can be checked using formative and summative assessments. Formative assessment takes place while learning and it is practiced for the sake of supporting the teaching/learning process, whereas summative assessment takes place at the end of semester or year of study and it turns around grades and marks. Testing is meant to provide a clear image about students' achievements following a set of standards (Hughes, 1996; Bachman & Palmer, 1996; Brown, 2003; Popham, 2003). Any testing system should be effective in the sense that it should have positive impacts on the teaching and learning practices, mainly in the case of official examinations that are designated for a large population.

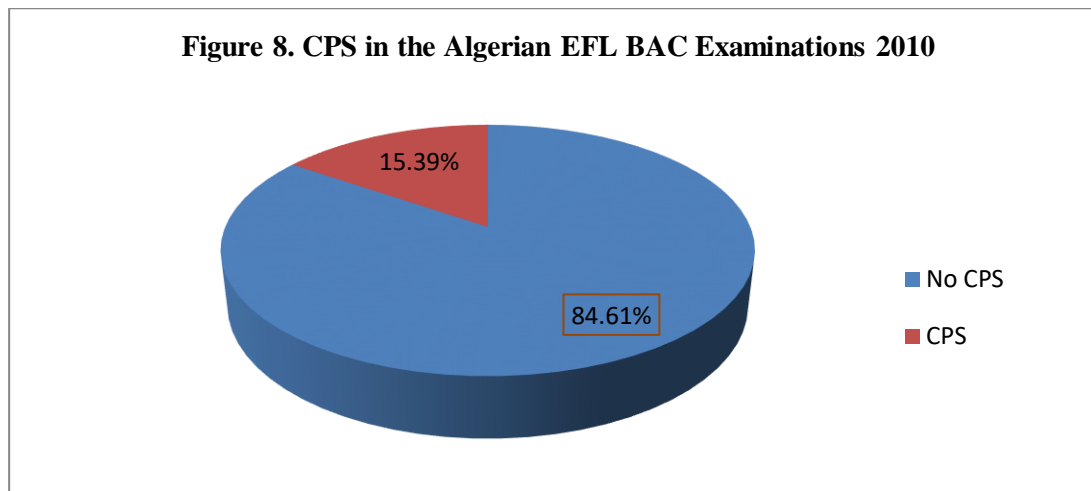
The present chapter has as its core aim the evaluation of the EFL BAC examinations set for students of the stream 'Literature and Foreign Languages'. The problem raised in the chapter is as follows: The tendency to continuously embark on intellectual and cognitive rigidity through the inculcation of the same formats of activities in the Algerian EFL BAC examinations seems to be a problem that requires deep analysis of the BAC Examinations seeking to figure out whether the BAC Examinations stress students' cognitive flexibility and, as a result, their problem solving skills.

VI-1-Findings

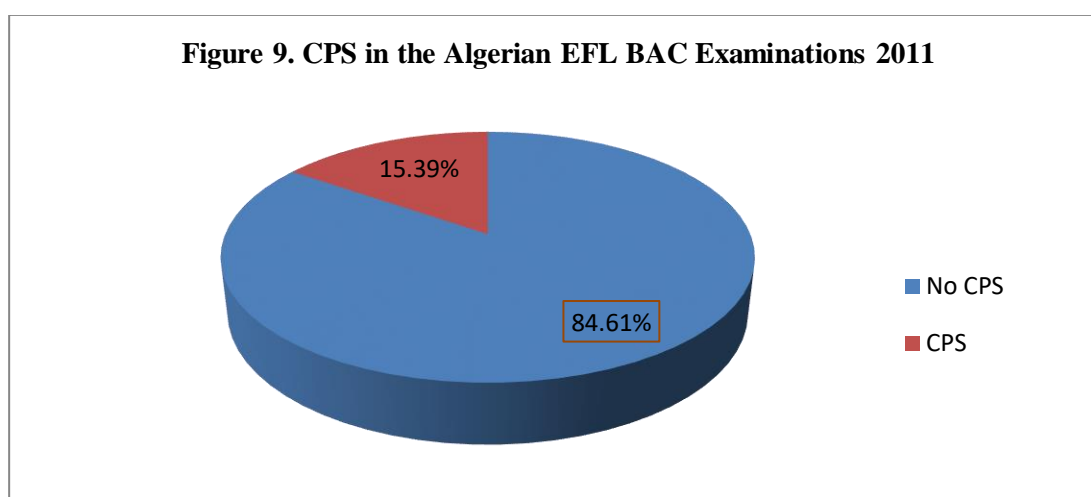
The following pie charts and bar charts display the findings obtained through the analysis of the EFL BAC examinations (Subject Two) regarding whether they stress complex problem solving or not. The analysis is ground in Marzano' Taxonomy and Cognitive Flexibility Theory.

Percentage formula= (Value/Total value) x 100

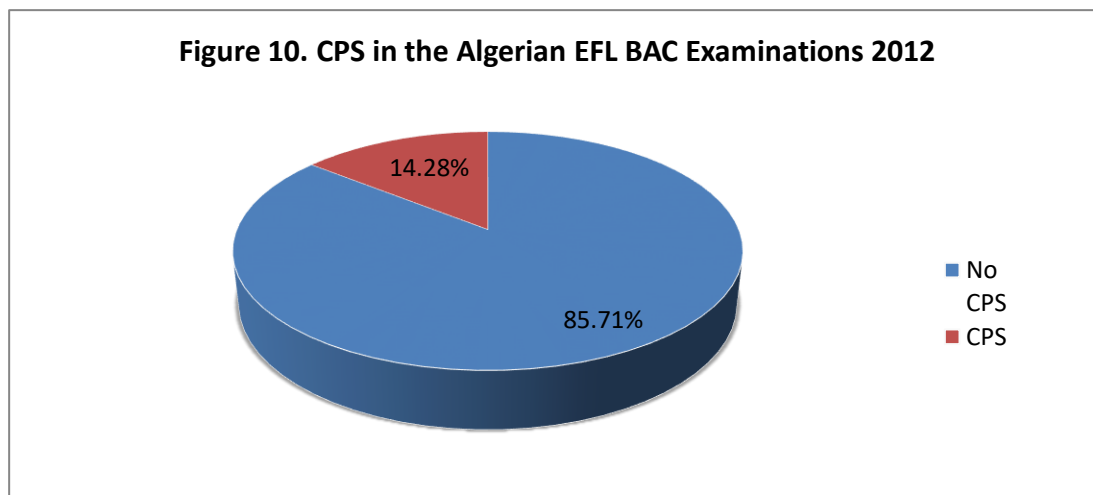
We divided the value by the total value and then multiplied the resultant by 100.



As it is indicated in Figure 8, one can see that most of the activities, that is, 11 out of 13 activities (84.61%) of the EFL BAC examination designed in 2010 (Subject Two) do not involve complex problem solving; because the activities do not incorporate the elements of cognitive flexibility theory, as well as the higher-cognitive processes of Marzano's Taxonomy. This implies that only 2 out of 13 activities(15.39 %) of the examination deal with complex problem solving (See Appendix 3, BAC 2010).



The data shown in Figure 9 suggest that 84.61% of the activities representing 11 out of 13 of the EFLBAC designed in 2011 do not incorporate complex problem solving, and that only 15.39% corresponding to 2 out of 13 do (See Appendix 3, BAC 2011).



As shown in Figure 10 the examination activities (85.71%), that is 12 out of 14 about are about lower-order thinking skills (See Appendix 3, BAC 2012). On the other hand, only 14.28% corresponding to 2 out of 14 of the BAC activities turn around complex problem solving.

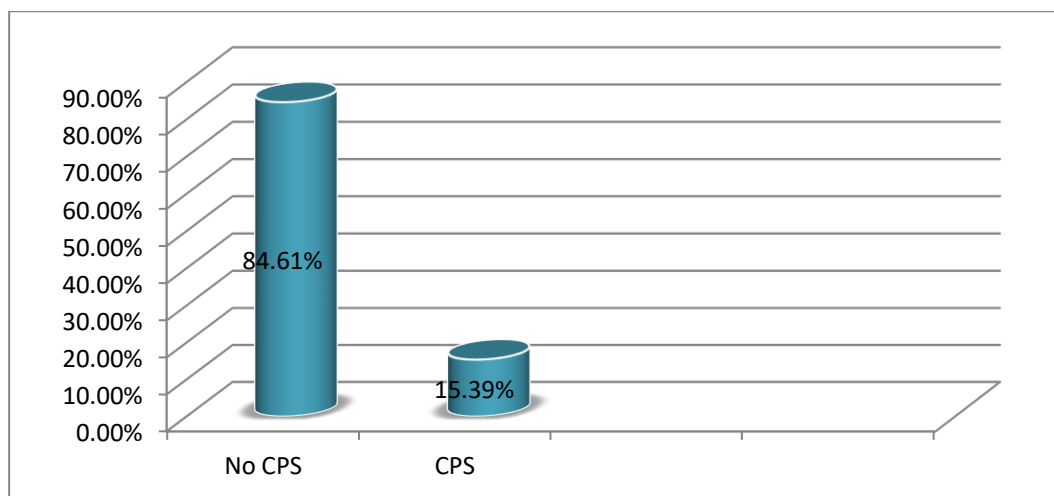


Figure 11. CPS in the Algerian EFL BAC Examinations 2013

Figure 11 encapsulates the findings obtained through the analysis BAC examination designed in 2013. Indeed, it appears that 84.61% of the BAC activities (11 out of 13) do not deal with complex problem solving and that only 15.39% (2 out of 13) do (See Appendix 3, BAC 2013).

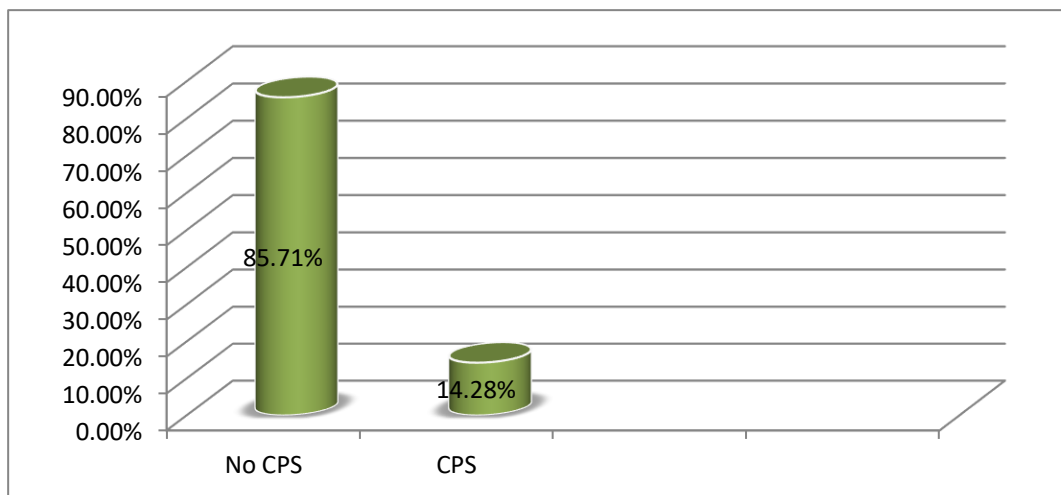


Figure 12. CPS in the Algerian EFL BAC Examinations 2014

The findings presented in Figure 12 suggest that 85.71% (12 out of 14) of the activities of the BAC designed in 2014 are basically about simple tasks, and that only 14.28% (2 out of 14) of the examination activities deal with complex problem solving (See Appendix 3, BAC 2014).

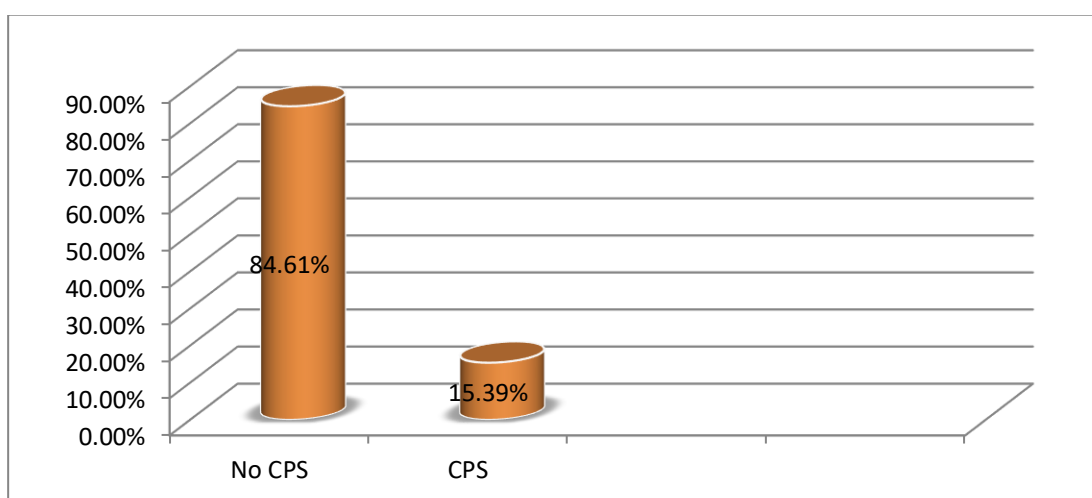


Figure 13. CPS in the Algerian EFL BAC Examinations 2015

Figure 13 shows that only 14.29% of the BAC activities (2 out of 14) designed in 2015 encourage complex problem solving and that 85.71% (12 out of 14) deal with routine and simple tasks (See Appendix 3, BAC 2015).

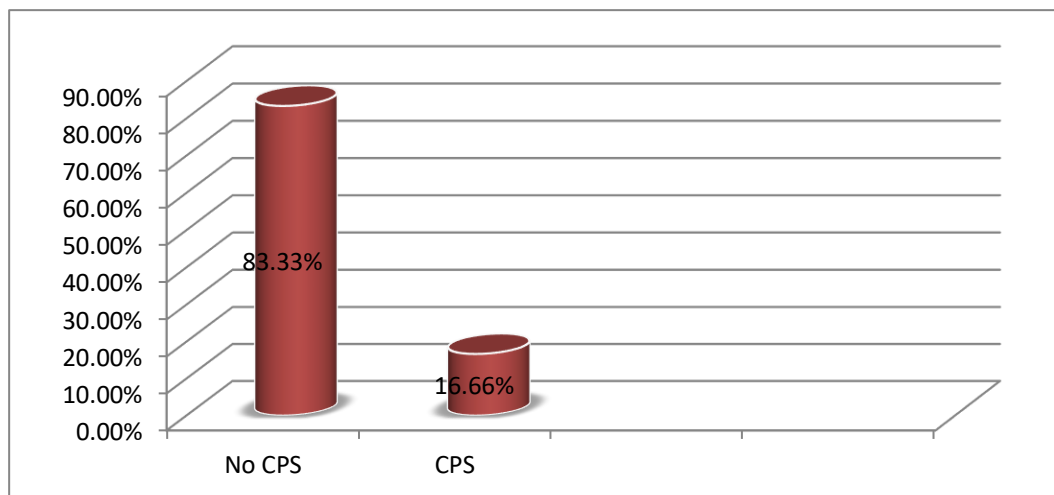


Figure 14. CPS in the Algerian EFL BAC Examinations 2016

As it is indicated in Figure 14 only a small portion (16.66%) or 2 out of 12 of the BAC activities designed in 2016 turn around complex problem solving, whereas (83.33%) or 10 out of 12 of the activities deal with lower-cognitive skills (See Appendix 3, BAC 2016).

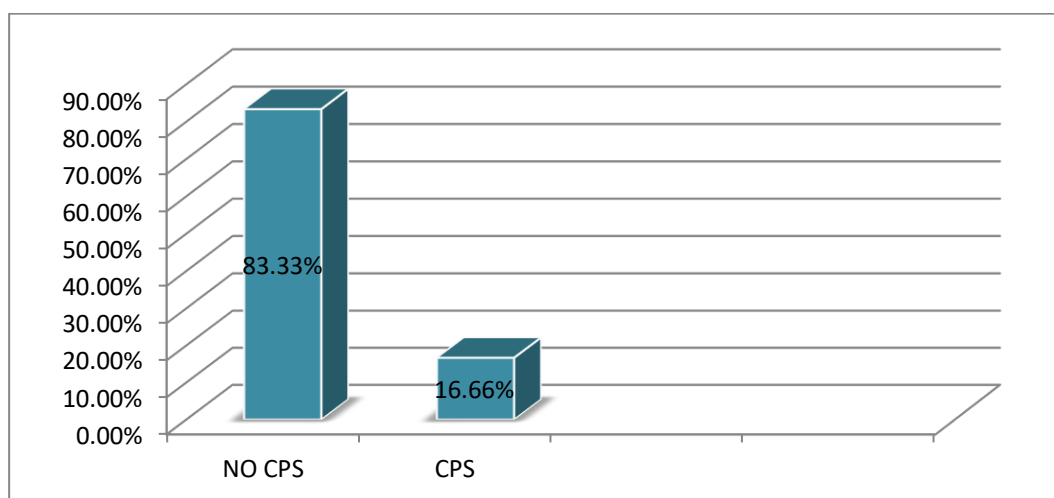


Figure 15. CPS in the Algerian EFL BAC Examinations 2017

The findings shown in Figure 15 mention that the biggest portion (83.33%) or 10 out of 12 of the activities of the BAC designed in 2017 do not revolve around complex problem solving. Conversely, 16.66% (2 out of 12) activities do involve complex problem solving (See Appendix 3, BAC 2017).

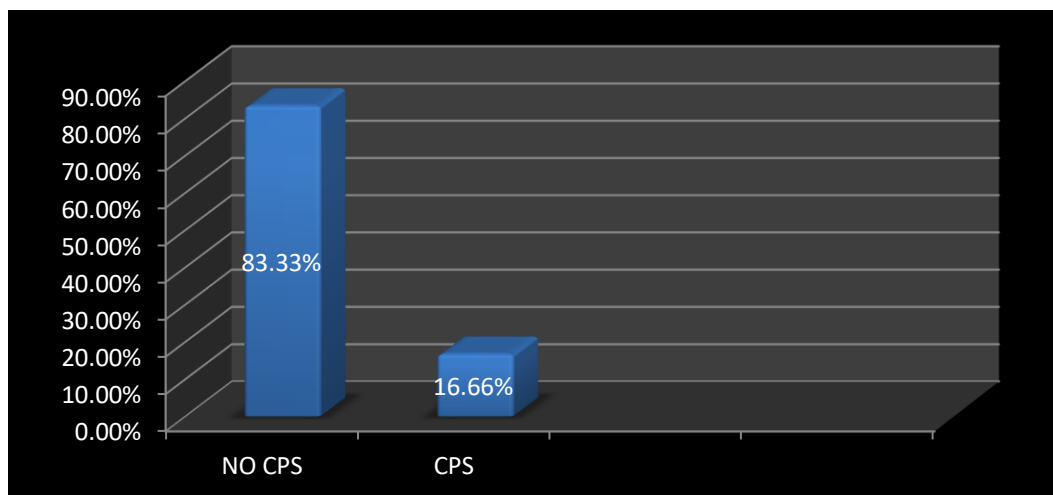


Figure 16. CPS in the Algerian EFL BAC Examinations 2018

The results illustrated in Figure 16 clearly convey the little importance (16.66%) accorded to complex problem solving in the BAC activities designed in 2018. Indeed, only 2 out of 12 activities involve complex problem solving (See Appendix 3, BAC 2018).

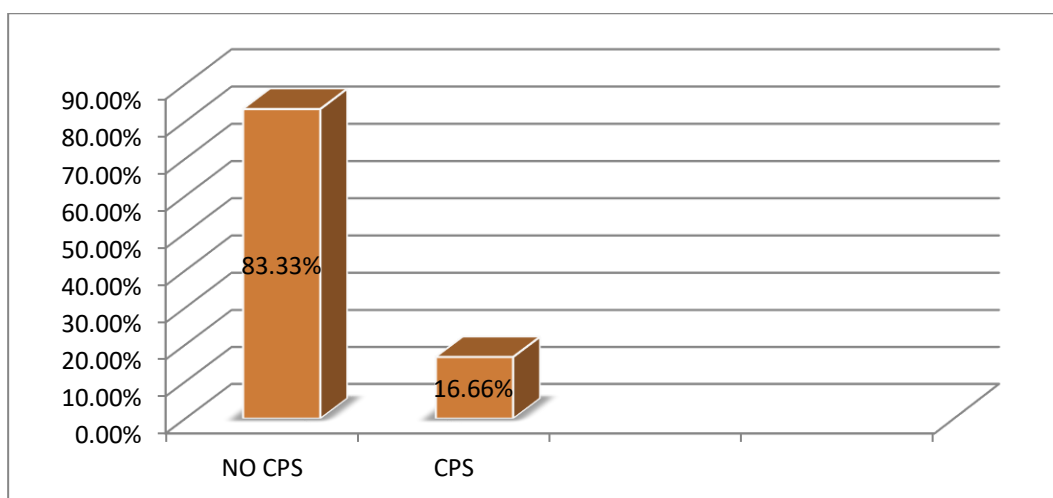


Figure 17. CPS in the Algerian EFL BAC Examinations 2019

As revealed in Figure 17, the activities that deal with complex problem solving in the BAC designed in 2019 represent only 16.67 % (2 out of 12) activities, and that 83.33 % of the examination activities (10 out of 12) do not foster complex problem solving (See Appendix 3, BAC 2019).

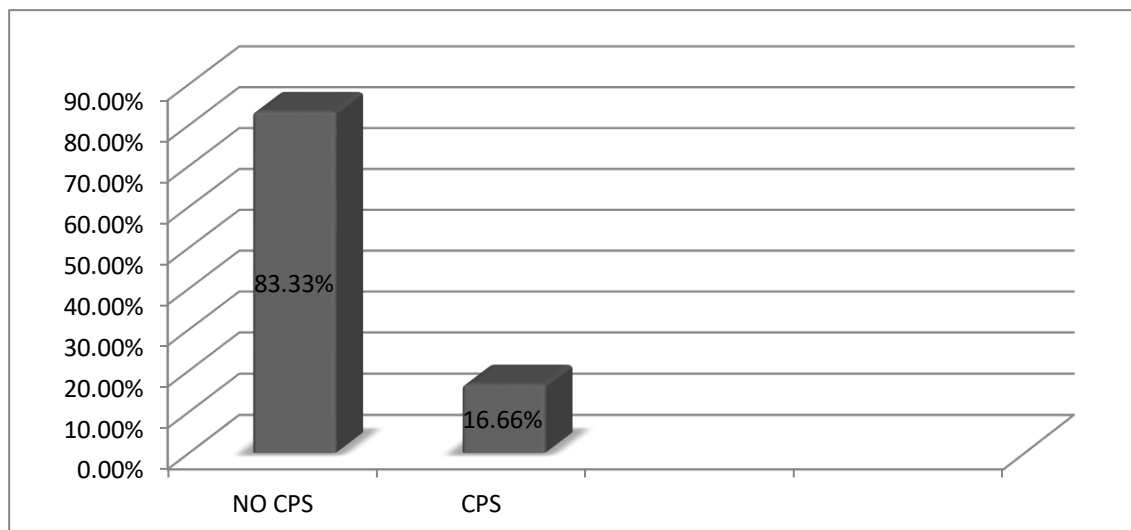


Figure 18. CPS in the Algerian EFL BAC Examinations 2020

The displayed findings in Figure 18 propose that the greatest part (83.33%) of the BAC activities designed in 2020 do not turn around complex problem solving. In fact, only 2 out of 12 activities incorporate complex problem solving (See the Appendix 3, BAC 2020).

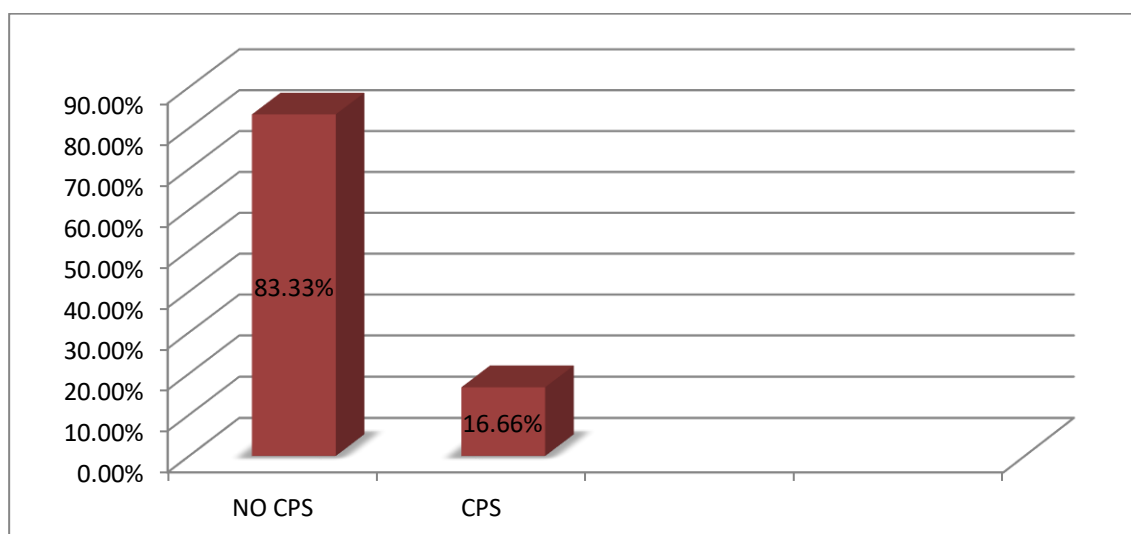


Figure 19. CPS in the Algerian EFL BAC Examinations 2021

Figure 19 shows the percentage of the activities dealing with complex problem solving (16.66%) in the EFL BAC designed in 2021. That is, only 2 out of 12 activities incorporate complex problem solving (See Appendix 3, BAC 2021).

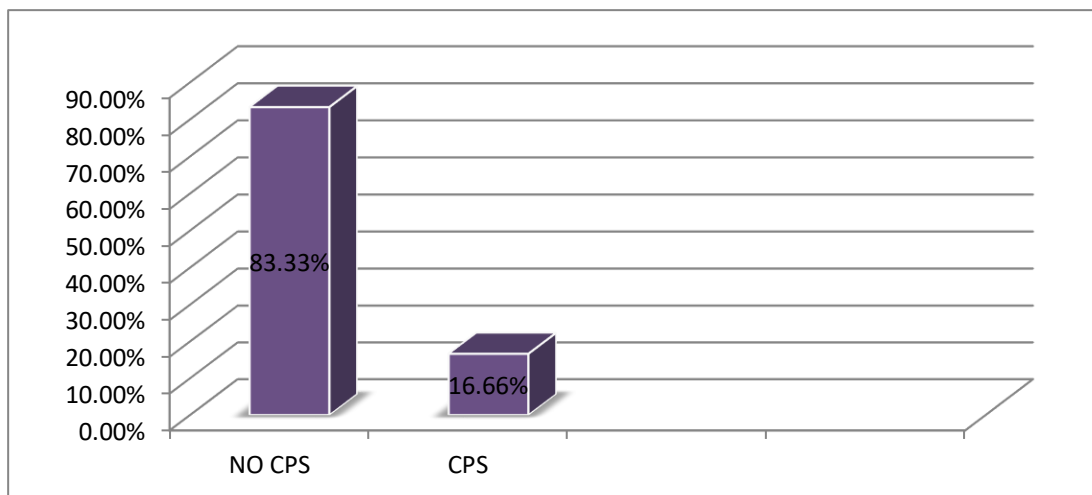


Figure 20. CPS in the Algerian EFL BAC Examinations 2022

The findings presented in Figure 20 propose that the majority of the BAC examination activities (83.33%) or 10 out of 12 do not involve complex problem solving and that 16.66% do (See the Appendix 3, BAC 2022).

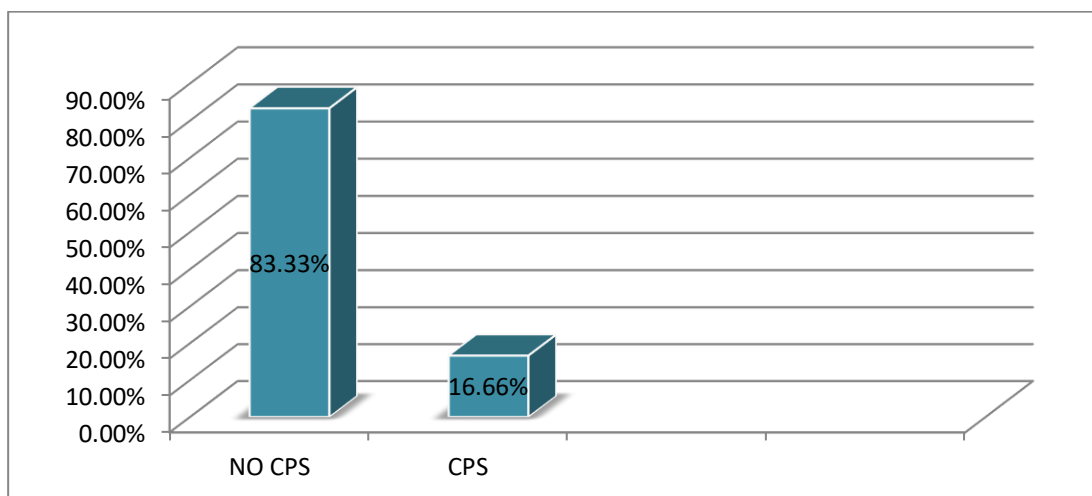


Figure 21. CPS in the Algerian EFL BAC Examinations 2023

As one can see in Figure 21, the results obtained through the analysis of the BAC examination activities designed in 2023 demonstrate that complex problem solving is not stressed in that only 16.66% (2 out of 12) of the total activities foster complex problem solving (See Appendix 3, BAC 2023).

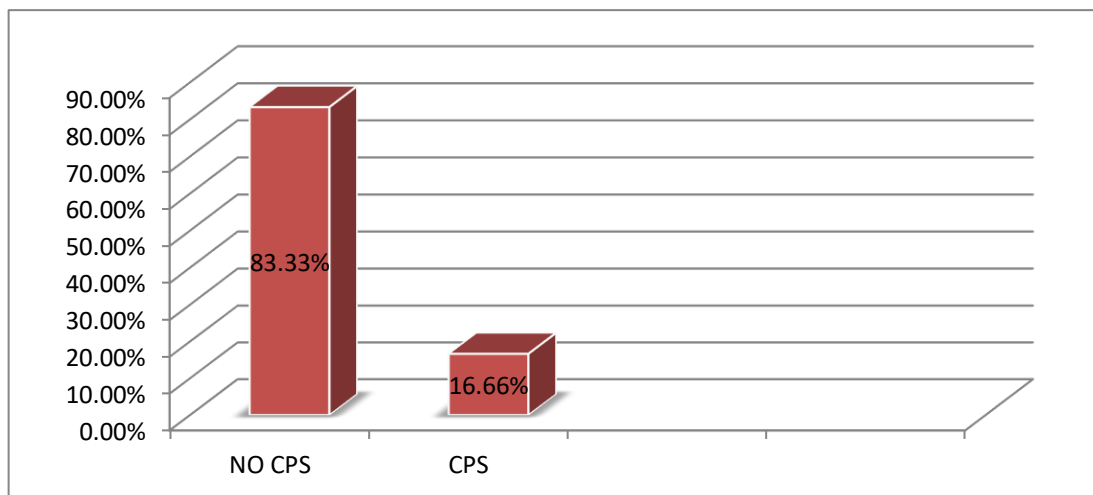


Figure 22. CPS in the Algerian EFL BAC Examinations 2024

As shown in Figure 22, the results suggest that complex problem solving in the BAC activities designed in 2024 occupies only 16.66% (2 out of 12), whereas the activities that relate to lower-order thinking skills occupy 83.33% (10 out of 12) of the BAC (See Appendix 3, BAC 2024).

VI-2- Discussion of the Findings of the BAC Exams

The analysis of the BAC examinations (Subject Two), designed from 2010 to 2024, reveals that stress is basically put on activities that require ‘recall’ and ‘comprehension’. Indeed, one can see that in the first two parts of the examinations: ‘Reading Comprehension’ and ‘Text exploration’ the students are mostly required to deal with ‘multiple choice’, ‘matching’, ‘fill-in-the blanks’, and ‘W/ H questions’. Indeed, the findings show that in the evaluated BAC exams of 2010, 15.39% deal with complex problem solving and 84.61% do not require students to resolve complex problems. The findings do not go in line with Molnár et al. (2022) who found that complex problem solving measurements can be used in educational contexts stressing students’ ‘exploration strategy, time-on-task, and number of trials.’

Being as such, the BAC activities typically require single-right answers that do not revolve around critical reasoning and deep thinking that form the foundation on which complex problem solving rests. In this vein, Thomson (2009) argues that critical reasoning is

mainly related to assessing and analyzing one's and other people's reasoning through activities, such as drawing conclusions, providing arguments, recognizing the unsaid beliefs, making inferences, as well as assessing and judging statements. The fundamental feature of all these activities, according to Thomson, is the capacity to use language clearly and with discrimination. Such types of reasoning activities are unfortunately not stressed in the BAC examinations. The following activities are illustrations

5. Classify the following words according to the pronunciation of their final 's'.

Boys - warriors -barracks - business

/s/	/z/	/Iz/

(BAC, 2010)

5. Classify the following words according to the pronunciation of their final 'ed'.

Educated -received - included - mixed -preferred -picked

/t/	/d/	/Id/

(BAC, 2011)

1. Choose the general idea of the text.

- Applying high expectations to Jackson students.
- Parents' work in South California.
- The principal describes the curriculum of Jackson school.

(BAC, 2012)

1. Circle the letter that corresponds to the right answer.

The text is....

- descriptive.
- argumentative
- narrative

(BAC, 2013)

2. Are the statements true or false? Write T or F next to the letter corresponding to the statement.

- All British universities are more recent than Oxford and Cambridge.
- Qualifications are required to enter the Open University.
- Higher education in Britain is free of charge.
- The majority of colleges and universities in Britain accept foreign students.

(BAC, 2013)

6. Fill in the gaps with words from the list.

Spartans - time -army -obedience -emphasized -girls

Ancient Sparta gave such a big importance to its(1)....that all the boys were brought up in a way that ...(2)...their physical fitness, courage and ...(3)...Only very little...(4)....was devoted to leisure or family life.

(BAC, 2014)

A careful consideration of the activities indicates that their main tenet is testing in a discrete way that is fundamentally thereat to guessing. In this vein, it should be mentioned that testing should be designed to stimulate students' abilities to solve complex and new problems by applying a range of skills and principles through written or spoken tasks. According to Polya (1962), the core feature of a problem is difficulty in that its solution should be generated by stressing one's higher-cognitive skills. This view deems to be a call to test designers to cater for what challenges the students to take initiatives to creatively approach life-like problems that are kin to life-long learning. There is no way for the students to become creative problem solvers if they are continuously required to mostly get engaged in doing mechanical drills and reproduction activities that are foundationally based on memorization and frequent repetition. In this regard, Ansarian and Mei Lin (2018) assert that the regret was that focus in traditional teaching was on massive information transmission and memorization, and students cognitive engagement, as well as experiential learning were almost totally neglected.

Students are intended to perform at a wide variety of stages relating to higher-order thinking skills. The key to that is to make the BAC examinations a collection of creativity and complex problems-driven tasks. No one can deny the necessity of providing the students' with opportunities that motivationally invite them to handle the twenty-first century skills, among of which there are: 1/Critical thinking and problem solving (expert thinking) 2/ Communication and collaboration (complex communicating) 3/ Creativity and innovation (applied imagination and invention) (Trilling & Fadel, 2009, p. 49). The inclusion of such skills in the analysed BAC examinations remains unsatisfactory to a very large extent.

It is worth mentioning that ‘multiple choice’, ‘matching’, ‘fill-in-the blanks’, and ‘W/H questions’ allow the test designers to get useful insights into the ideas of students’ mastery of language basic structures, and their responses often indicate their level of understanding as well as their strengths and weaknesses regarding grammatical competence. The latter represents one of the components of communicative competence (Hymes, 1972; Canale & Swain, 1980, Savignon, 1997). It is not, however, the aim of effective instructional policies to make all or the majority of assessment activities turn around discrete language structures. In this regard, Islam and Mares (2014) affirm that teaching materials should basically be designed to develop and enhance students’ higher-cognitive skills.

The importance of testing students’ knowledge of basic skills remains undeniable as long as language functions through sounds, structures, and meanings. The students need to be assigned activities that deal with lower-order thinking skills in terms of ‘knowledge’, ‘comprehension’, and ‘application’(Bloom, 1956), or in terms of the two levels: ‘retrieval’ and ‘comprehension’(Marzano, 2001). In this context, a set of instances from the analysed examinations can be shown to make the idea closer to the reader. Indeed, one can read:

. Part One: Reading

A. Comprehension

Read the text carefully and do the activities.

1. Write a letter which corresponds to the answer a, b, or c.

The text is taken from:

a- a history book b- a website c- a newspaper article

2. Are these statements true or false? Write T or F next to the letter corresponding to the statement.

- a. Many civilizations always developed in friendship and agreement. .
- b. Common frontiers helped interaction and exchange among civilizations.
- c. The Islamic civilization learnt from the past to improve the present.
- d. Isolation cannot cause a lot of harm to the Islamic civilization.

3. Read the text and put the following sentences in the order they appear in the text.

- a- Mass media has transformed the world into a tiny village.
- b- Past misunderstandings can teach people a lot of things about the future.
- c- Islam values can be taught through tolerance and openness.

d- Regardless to their differences, civilizations have learnt from each other. (BAC, 2015)

There are, however, problems associated with such activities in that they do not mirror cognitive flexibility because they do not require ‘multiple-representations’ and that storage of fixed knowledge is not devalued in favor of the “mobilization of potential knowledge” indicating that knowledge construction ought to be flexible and creative (Spiro et al., 1988). In addition, the activities do not represent ill-structuredness as they require single-right answers. In such a way, making recourse to deep thinking by treating irregularities and exceptions as key elements of cognitive flexibility theory are far from being stressed and valued throughout the activities.

Part One: Reading.

A/ Comprehension and Interpretation.

Read the text carefully and do the activities

1- Write the letter which corresponds to the right answer.

A- Germanic tribes moved to ...

a) northern Europe b) central Europe c) various European regions

B- The native inhabitants of the British Isles were ...

a) the Saxons b) the Celts c) the Angles

C- Old English is a mixture of languages.

a) Celtic and Saxon

b) Celtic and Angle

c) Saxon and

Angle

2- Fill in the following table with information from the text.

The Angles and the Saxons migrated...	from	To	time of resettlement	mixed wit

(BAC, 2016)

The analysis suggests that great effort is required to encourage students to go beyond basic skills and lower-order thinking levels to reach deep thinking and critical reasoning in solving new and complex problems. This should undoubtedly be at the heart of the testing system on

which the EFL Baccalaureate Examinations in Algeria should be based. Shaped differently, the kind of knowledge and skills the students are expected to exhibit should be explicit indicators of meaningful cognitive processes required for new and creative performance. For example, Wiggins (1993) highlights that “in the assessment of intellectual outcomes, substantial attention should be devoted to more sophisticated skills such as understanding of principles, applying skill and knowledge to new tasks, and investigating, analyzing, and discussing complex issues and problems” (p. 27).

There is no such a thorough treatment of the field of testing without accounting for the notion of ‘washback’ or ‘backwash’ as the impact, be it negative or positive, of testing on students (Andrews, 1994; Alderson & Hamp-Lyons, 1996; Bachman & Palmer, 1996; Bailey, 1996, 1999; Altowaim, 2015). In the case of the analysed examinations, one can strikingly notice the recurrence of the identical testing formats through years. Indeed, it can be asserted that the testing formats have been the same since the education reform in 2002 and even before that. This would have a negative impact on the students’ consideration of other testing formats. Accordingly, the notion of ‘negative washback’ quickly and directly surfaces in such instances of testing. The students’ horizons and perspectives become limited as the testing formats do not allow them to exhibit personal and original pieces of knowledge and skills. The students, as a result, would make less and less efforts in looking for strategies and skills that support them to handle original and complex language problems intelligently and creatively. In this vein, Pickford and Brown (2006) highlight that students’ learning is impacted by the testing practices and culture in that if the testing activities turn around recall and memorization the students, hence, will limit themselves to just store and memorise information. Nevertheless, if the testing focal aim is to figure out and evaluate students’ deep understanding, the testing activities accordingly should be designed stressing the principles of deep thinking.

Stimulating the students' cognitive capacities to produce original pieces of knowledge is to be emphasised in examinations; because, this would boost the students' motivation and engagement in approaching tasks that reflect their aspirations and needs. The idea is that authentic tasks are to be viewed as sources of motivation and enthusiasm in education. This point has not been stressed in the first two parts (Reading and Text Exploration) of the evaluated examinations. Ansarian and Mei Lin (2018) mention that in PBL students' motivation and their involvement to learning are increased through authentic or real-world language problems.

According to Spiro et al. (1988) the first element in Flexibility Theory as a crucial aspect in problem solving is "avoidance of Oversimplification and Overregularizations". As it has already been mentioned in the literature review, for the oversimplification and overregularization cognitive flexibility theory emphasizes 'component interactions', 'conceptual combination' 'selective use of knowledge', and 'knowledge assembly' (Spiro et al., 1988, pp.4-5). Such an element is not stressed throughout the evaluated BAC Examinations with the exception of the second topic in the Written Expressions of the testing materials. Illustrations of the exception are the following:

Written Expression

Choose ONE of the following topics.

Topic one

Today the Arab nation is facing serious problems. Is it a sign of its decline as a civilization?

Write a composition of 120 to 150 words to state your opinion.

You can use the following notes:

- instability/internal and external conflicts
- economic dependency/reliance on oil incomes
- attempts to solve out the situation (BAC, 2015)

Written Expression

Choose ONE of the following topics.

Topic one:

Your cousin is an intellectual who obtained a scholarship to the USA. He is planning to settle there. Write an e-mail of about 80 to 100 words to convince him to return to Algeria and

benefit his country from his knowledge and skills.

The following notes may help you:

-far from family -Algerian scholarship -benefit/country/experience -create wealth

-help fellow citizens

(BAC, 2018)

Through Topic One (BAC, 2015 and BAC, 2018), the students are asked to write compositions using provided hints. Indeed, in Topic One (2015), the students are required to write a composition of 120 to 150 words to justify their opinion about whether the social, economic, and political problems the Arab nation is going through represent signs of its decline as a civilization. Even if the students are provided hints, a related point is that focus is on the cognitive demands of the task to use the points convincingly to defend their opinions and suggest potential solutions. It can, therefore, be assumed that the levels ‘retrieval’, ‘comprehension’, ‘analysis’, and ‘knowledge utilization’ in Marzano’s Taxonomy are stressed. Furthermore, the two components of cognitive flexibility theory including ‘multiple representations’ and ‘schema assembly’ are embodied in Topic One (BAC, 2015). Likely, in Topic One (BAC, 2018) the students are encouraged to stress Marzano’s Taxonomy levels in terms of ‘analysis’, and ‘knowledge utilization’, as well as cognitive flexibility theory’s levels in terms of ‘multiple representations’ and ‘schema assembly.’

Written Expression

Choose ONE of the following topics.

Topic two:

Recently, the world of sport has been shaken by a violent corruption scandal. Members of the Federation of International Football Association (FIFA) were accused of bribery and other unethical practices. Write a composition of about 120 to 150 words about some of the wrongdoings that give a bad reputation to the practice of sports. Illustrate your production with concrete examples. **(BAC, 2016)**

In many cases, students would be pushed to become passive absorbers of knowledge when it comes to undertake simple mechanical drills. Tasks should be moderately challenging respecting the students’ levels and needs (Delisle, 1997). Students’ motivation should continuously be stressed in the process of learning. Undertaking creative and difficult tasks in

an environment that is safe and supportive would encourage the students to follow their individual methods of knowledge exploration and construction through problem-based learning. In this context, Jonassen (2004) highlights that to resolve problems that are featured with high complexity and ill-structuredness, the students ought to be engaged in that kind of reasoning which goes beyond the comprehension and memorization stages. The students face problems in solving ill-structured problems because of their cognitive rigidity in that they follow a one-way-thinking process; the one their teachers inculcated in their minds. Such an instance is highly reflected in the dominance of discrete-point items in the examinations as it is illustrated in the following activities:

Part One: Reading

A. Comprehension

2. Are these statements true or false? Write T or F next to the letter corresponding to the statement.

- a- Only Spartan male citizens were trained to fight.
- b. The Perioeci class was a wealthy one.
- c. The Helots uprose against the Spartans.
- d. No great works of art came from Sparta.

B. Text Exploration

1. Find in the text words or phrases that are closest in meaning to the following:

- a. violent (§1) b. governed (§2) c. hatred (§2) d. commerce (§3)

2. Complete the chart as shown in the example.

	Verb	Noun	Adjectives
example	to differ	difference	different
	.....	strength	.....
	to create	.....	.....
	.....	.....	Free
	

(BAC, 2024)

These three activities that figure in BAC (2024) are closely tied to traditional ways of testing whose focus is on language structures and isolated language items. The testing of language items could have been done through authentic tasks that would incite the students to reflect on the strategies that allow them to set connections between the various parts of

knowledge they need to build. This is because when testing is practised through a range of authentic tasks the students are likely to be put in a constructivist environment. Pritchard (2009) explains that in constructivism what is important is knowledge construction and not knowledge reproduction. In the case of the analysed examinations, with the exception of the last two tasks dealing with essay writing, all the examinations activities deal with reproduction rather than with creative knowledge construction. The following examples illustrate the case:

3. Divide the following words into roots and affixes.

words	Prefix	Root	suffix
betterment interaction environment			

(BAC, 2015)

4. Classify the following words according to the stressed syllable.

Information - protect - authorities - minimize

1st syllable	2nd syllable	3rd syllable

(BAC, 2020)

Being exposed to activities that are threat to guessing, the students would develop a very negative habit of having more and more tendency to easy tasks and speculation. The negative impact of the tasks that can be only answered through guessing on the students' motivation and hard work, as well as on their thinking faculties is undeniable (Ansarian & Mei Lin, 2018). Students need to be encouraged to make use of their background knowledge to look for solutions to new problems that trigger their creative capacities rather than inciting them to embark on a plethora of activities that are totally annexed to lower-order cognitive processes and mere memorization.

Students are constantly in need to be put in the context of a more alternative setting in which constructivist approaches are prioritized. In brief, the test designers' duty should mirror

the concretization of an environment that represents a fascinating invitation to autonomy (Boud, 2015) and risk taking (Shaftel & Shaftel, 1967), as well as to principled knowledge analysis and evaluation. Eventhough this does not exist in the analysed examinations, it is high time to have another critical look at the testing policy in the Algerian context. An examination policy is always an inherent part of the duration system. In this vein, Popham (2003) emphasises that a strong testing system should include a range of measures carefully oriented towards the curriculum designers' responsibility to include in the teaching and testing policies amendments that call on the teachers and test designers to promote students' academic achievements in the classroom and during standardized and official tests stressing the resolution of complex problems through the channel of deep thinking and effective communication. A coalescence of the two (deep thinking and effective communication) might help students to efficiently handle real-life situations by successfully getting engaged in tasks out of the school contexts (See Bachman, 1990; Bachman & Palmer, 1996; Pritchard, 2009)

It could be inferred from the data obtained through the analysis of the BAC examinations that the 'analysis' level is almost totally neglected. Preventing the students from analysis tasks is preventing them to develop principles that allow them to break knowledge into small pieces and then explain the link between the pieces. This is one of the foundational keys to higher-cognitive skills as Newmann (1990) clarifies that lower-order cognitive skills solely require the use of already obtained knowledge routinely and mechanistically. Conversely, higher-order cognitive skills require the students to get involved in interpretation and analysis tasks, as well as in information manipulation, and that problem solving does not take place through background knowledge routine application.

Additionally, if the 'analysis' skill is stressed throughout the BAC examinations, this will certainly be an explicit call for the students to care about background knowledge. This raises the students' responsibility and awareness to acquire as much such as possible of

knowledge and skills that represent the basis for effective analysis. The students' behaviors could be adjusted and made better through effective teaching and testing practices. The day the students see the inclusion of analysis tasks in the BAC examinations, they will start caring about that by trying to understand the true meaning of analysis and the right ways how to get there. The students will realize the importance of reading, taking and making notes in a principled way. The students, of course, need to be guided by their teachers to successfully handle analysis tasks. The importance and significance of the principle 'practice makes perfect' at this stage become visible. The idea is that the students need to be exposed to situations to analyse knowledge individually and in groups.

The role of the teachers in instances in which analytical tasks are emphasised should be confined to teaching the students true meaning of analysis and the techniques to use to analyse knowledge effectively. Though this seems to be time consuming, the teachers could set schedules to include classes to inform the students' about their strengths and weaknesses regarding analysis. Little by little the students could become independent in assessing themselves when doing analysis tasks. For example, Whitten and Graesser (2003) highlight "A multiple regression analysis revealed that text comprehension, problem representation, problem categorization, planning the solution, and self-evaluation were significant predictors of the accuracy of the solution" (p. 211).

There is no such a perfect testing system. However, the inclusion of the foundational principles in any testing system should always receive great attention. This is a sine qua non condition for significant academic achievements. In the analysed examinations, a set of lacks are to be highlighted and mentioned. For example, in many cases the students' autonomy has not been stressed. The following activities illustrate the point

4-Classify the following words according to the stressed syllable.

education - environment - drawbacks – personality

First syllable	Second syllable	Third syllable
----------------	-----------------	----------------

5-Fill in the gaps with only four words from the list given

visit – values – opportunity – teachers – create – educational

In some countries, families may organize home schools like a conventional school, with structured

daily activities. Others view all of life as an(1)..... for learning and use a very flexible schedule. They

provide ...(2)... experiences outside as well as inside the home. Their children may ...(3)... museums,

work in a garden, or serve apprenticeships. Other families even ...(4)... their own materials. (BAC, 2023)

The needs for testing improvement are too great. At the level of format, the students need to experience tasks that target analysis and intelligent knowledge application in new problematic situations through formats that support the students' cognitive flexibility far from tying the students to previously experienced routine knowledge. This contradicts with Choi et al. (2014) who found that critical thinking is positively linked to problem solving and self-directed learning and problem-solving was positively associated with self-directed learning.

The creation and maintaining of supportive testing formats that elicit complex cognitive processes is a prerequisite for effective testing. Open-ended questions dealing with higher-order thinking skills and decision making could, at this stage, be encouraged. This, in a way or in another, would allow and help the students responsibly care about their range of intellectual and general abilities. In this vein, Shuell (1990) contends that problem solving incorporates sound decision making, deep thinking, and evaluation of possible alternatives. By so doing, the students, little by little, get familiar with a new mode of testing, which might be coupled with a set of difficulties in the beginning. Such difficulties are to be overcome by valuing personal efforts, and by taking advantage of other competent individuals' guidance, mainly that of the teachers.

When the students know that their success in the official examinations, like that of BAC, has been reached through the accomplishment of tasks that mimic real-life problem situations, then the striving for more effective learning and success can, in part, be enhanced. As a result, growing recognition of the importance of complex and creative problem resolution will see the day. The students would make a shift from mere reproduction of what has been studied to new and creative solutions generation.

The establishment of new and solid testing system can take time. The beginning would be general targeting a testing culture through official documents and curricula. Then, teachers' training becomes necessary so that every teacher would grasp the true meaning of assessment literacy and what is expected from them in terms of teaching that would prepare the students to cope with such a testing system. More importantly, test designers have their responsibility in constructing tests that offer the students the chance to display their smart connections of their background knowledge with useful pieces of newly constructed one.

The complexity of teaching in terms of the incorporation of the students' intelligences and learning styles into the classroom practices, as well as the organization of individual, team, and group work using a range of teaching materials ought to be matched with the way the students are being tested and evaluated. Testing is the translation of what has been practiced in the classroom. This allows to say that teaching changes testing, and testing, in its turn, has a deep impact on teachers' practices and students' learning. The interconnectedness between the two makes it impossible to experience change in the testing system without a significant change in the teaching practices.

Students need to master a set of principles in problem solving if they are to function as competent problem solvers. Of the principles, problem recognition is prerequisite. Then, problem understanding requires the students to get a clear meaning and image of the problem. In addition, the students need to create ideas leading to solution generation. Furthermore, the

application of relevant problem solving strategies is fundamental. Finally, the students have to choose from the alternatives the best solutions. All in all, the students are called on to make use of their higher-level cognitive processes in a strategic way so that to successfully handle complex problems. In this regard, Zimmerman and Campillo (2003) state that expert problem solvers have more effective self- monitoring and self-evaluation strategies than novices. In addition, they are more motivated and knowledgeable in strategic solution formulation. Because the majority of the activities (83.33%) that are included in the analysed BAC examinations require only single-right answers, the students' motivation will decrease regarding the application of a set of problem-solving strategies to handle complex and open-ended issues. This is mirrored in Heine's (2010) view that problem solving is principally about the resolution of complex tasks.

To allow the students to display their ability to construct creative solutions, rules should be established regarding the best ways to make the students become aware of the existence of a wide range of problem solving strategies and how to apply them in a practical way. In this context, Brookhart (2010) suggests to get the students involved in problem solving by requiring them to make use of a variety of problem-solving strategies, and then asking the students to justify their choice regarding the strategies.

The role of students' background knowledge in complex problem solving is crucial. The students pick up pieces of what they have already learned to link them to the novel knowledge that they construct. Accommodation for the sake of reaching equilibration (Piaget, 1959; Piaget & Inhelder, 1969), at this stage, is required. The students' selection of pieces of knowledge cannot take place randomly. Indeed, such a task should rest on sound decision making following a set of valid and reliable criteria. This is tightly linked to the element of cognitive flexibility theory which is 'schema assembly' in that in the domains that are

complex and ill-structured there should be a shift from the use of ‘rigid’ structures of knowledge to ‘flexible’ ones (Spiro et al., 1988, p. 8).

Teaching practices should allow learners to become competent problem solvers who are able to generate solutions to novel and complex problems. At this stage, a comprehensible and solid match and accordance between the teaching policy and the testing policy is highly required so that learners get the best return of their learning efforts. The spreading of new testing practices that value complex problem solving should start by informing teachers about their responsibility to check to see if sufficient attention is given to complex problem solving by looking at the amount of time allotted to such endeavor.

The majority of the evaluated BAC examinations activities deal with completion tasks as the following illustrate:

2. Complete the chart as shown in the example.

	Verb	Noun	Adjective
example	to educate	education	educational
	.....	qualification	.....
	.....	.....	.specialized
	to respect	.....	.....

(BAC, 2013)

4. Classify the following words according to the pronunciation of their final ‘s’.

colleges - qualifications -students - courses

/s/	/z/	/ɪz/

(BAC, 2013)

The activities do not meet the requirement of cognitive flexibility theory in terms of: ‘avoidance of oversimplification and overregularizations’, ‘multiple representations’ ‘schema assembly’, and ‘multiple interconnectedness.’ Besides, the activities are not in accordance with the principle that the students need to be presented with tasks that invite them to think

about the relevant data and contents to generate in problem resolution. In this vein, Renninger (2010) estimates that “working with and cultivating the interest of learners in earlier phases of interest development involves being informed about both their motivational profiles and their readiness to engage disciplinary content” (p. 129). The idea is that effective knowledge assimilation fundamentally rests on understanding the differences and affinities that exist among the various parts of knowledge, and then knowing how to join together those knowledge components that are joinable and interrelated. Such a principle in cognitive flexibility theory involves understanding, knowledge analysis, and synthesis. The first is a lower level in Bloom’s taxonomy and the last two belong to higher-cognitive skills in the taxonomy.

The second element to be stressed in Cognitive Flexibility Theory for complex problem solving, according to Spiro et al., is ‘**multiple representations**’. In the case of the present study, the analysis of the BAC examinations revealed that in most cases the students have not been exposed to ‘**multiple representations**’. A straightforward explanation of this stems basically from the fact that the majority of the BAC examinations activities turn around “recall” and “comprehension” as two cognitive levels in Marzano’s Taxonomy. This is in contradiction with what Todd et al. (2023) have found that multiple tasks during creative problem solving assessment can be implemented and used.

Interestingly, it should be mentioned that the majority of the activities of the exams do not have a complex structure. The students just should delve into simple memorization of basic skills, mainly “recall” and “comprehension” to be successful in doing the activities. As it has previously explained, the ill-structuredness and complexity of domains and cases require a multi-facet knowledge representation. That is, “Knowledge that will have to be used in many ways has to be learned, represented, and tried out (in application) in many ways” (Spiro et al., 1988, P. 5). In such a way, cognitive flexibility theory could be said to

emphasize students' multiple intelligences and their diverse learning styles, as well as the efficient use of multimedia.

The third element to be considered in complex problem solving model is '**centrality of cases**'. The data gathered from the analysis of the BAC examinations allow asserting that the students in most of the cases do not need effective reasoning that stems from already experienced instances as a key to handle the high variability and multidimensionality of cases in ill-structured domains. As it was mentioned previously "in ill-structured domains, there is great variability from case to case regarding which conceptual elements will be relevant and in what pattern of combination" (Spiro et al. 1988, p. 7). The unique case that represents an exception to this is the second topic of the "Written Expression" of the examinations. An illustration of this exception are the following examples:

Topic Two:

Nowadays, the adoption of online learning in our schools has become a necessity. Yet, most students still can't even afford a computer. Imagine you are one of them; write a newspaper article of about 120 to 150 words to urge the National Education authorities to promote this option by providing systematically the students with the necessary technological means. (BAC, 2022)

Topic Two:

Child labour has become a social evil, especially in the third world countries. Write a letter of about 80 to 120 words to the UNICEF representative in your country to denounce this unethical practice, and to urge this organization to take the necessary measures to eradicate this phenomenon. (BAC, 2023)

Topic Two:

Your child's school needs improvements in order to ensure a better learning environment. As a member of the parent-teacher association, write an opinion article of about 80 to 120 words for the school magazine to suggest possible solutions to improve school life. (BAC, 2024)

The students at this stage need effective reasoning relying on their background knowledge to explain their ideas in a coherent and cohesive way stressing personal understanding and concrete examples. In addition, the students' clarity in their writing could be achieved by setting an outline that takes into account the key terms to be included as

variables in their pieces of writing. This is a positive aspect of the BAC examinations in that the students' cognitive skills, be them higher or lower, are stressed, as well as their autonomy in that they have not been provided with hints and cues to produce their answers.

The fourth element to be considered in complex problem solving is '**schema assembly**' or shift from '**rigidity to flexibility**'. Throughout the evaluated examinations, it has been noticed that the students are not encouraged with tasks that incite them to delve into effective decision making regarding information gathering, the use of effective problem-solving strategies, as well as decision making regarding the best solutions to be implemented in a synthetical way. As it has already been mentioned, decision-making is a crucial aspect in problem solving through which the problem solver manages to judge the efficiency and validity of the problem-solving process and the problem-solving product; that is, the final state. As it has been indicated in the review in the domains that are complex and ill-structured there should be a shift from the use of 'rigid' structures of knowledge to 'flexible' ones. The idea is that it is not possible to possess a 'prepackaged schema' for all cases (Spiro et al., 1988, p. 8).

The fifth element to be considered in complex problem solving is '**multiple interconnectedness**'. The analysis of the BAC examinations has shown that the students have not been challenged with tasks that stimulate their thinking aptitudes in terms of '**multiple interconnectedness**'. Indeed, as it has already been explained and indicated the examinations parts in most cases turn around "recall" and "comprehension" with the aforementioned exception relating to the fact that the students in the second topic of the "Written Expression" of the examinations they have been given the chance to evaluate the relevance and validity of their information, ideas, explanations, and style when writing their compositions. In ill-structured domains, it is not acceptable to view concepts as disparate 'chapters'. Instead, concepts are to be treated as interconnected entities. Accordingly, "rather

than relegating concepts or cases to separate compartments, chapters, and so on, our systems strive for *multiple interconnectedness (of cases and concepts along multiple conceptual and clinical dimensions.*” (Spiro et al., 1988, P. 8)

Conclusion

The present chapter has dealt with the evaluation of the EFL BAC examinations (Subject Two) designed from 2010 to 2024 for third-students in the Algerian secondary schools in terms of cognitive flexibility as a means to the development of students’ complex problem solving skills. The evaluation was grounded in two theories: Marzano’s New Taxonomy and Spiro et al.’s Cognitive Flexibility Theory. The study involved a corpus made up of 15 examinations, designed from 2010 to 2024.

The findings have revealed that the examinations do not stress cognitive flexibility in terms of: (1) ‘avoidance of Oversimplification and Overregularizations’, in that the problem must demonstrate complexities and irregularities, (2) ‘multiple Representations’ entailing the avoidance of single representations of knowledge (e.g., single schema, organizational logic, line of argument, prototype, analogy, etc.), (3) Schema Assembly (from Rigidity to Flexibility) involving a shift from the use of ‘rigid’ structures of knowledge to ‘flexible’ ones by stressing open-ended questions revolving around deep and critical thinking. The evaluation, has demonstrated that less than 20 % of the BAC examinations ‘activities stress cognitive flexibility and that more than 80% of the BAC activities do not foster cognitive flexibility. Additionally, the analysis has shown that stress is basically put on activities that require ‘recall’ and ‘comprehension’ as two cognitive skills in Marzano’s Taxonomy. Consequently, a set of recommendations have been offered for the sake of improving the examinations in terms of cognitive flexibility and complex problem solving.

It becomes clear, then, the answer to the fourth research question: Do the EFL BAC Exams account for the EFL learners’ cognitive flexibility to solve complex problems? is to be

answered stating: No, the EFL BAC Exams do not account for the EFL learners' cognitive flexibility to solve complex problems. As a result, hypothesis Four: **No, the EFL BAC Exams do not account for the EFL learners' cognitive flexibility to solve complex problems** has been confirmed.

Chapter Seven: An Experimentation on the Effectiveness of Polya's Model in Problem solving in the Algerian EFL Context

Introduction

The present chapter seeks to figure out the impact of Polya's problem solving model on the students' abilities to solve problems in EFL. To reach such an aim, experimentation, including two groups: a control group and an experimental group was carried out. As it has already been mentioned, the experimentation took place on April, the 4th, 2018 in two selected Secondary Schools in Naciria (Lycée Said Boukerou), Said Boukerrou secondary school located in (Boumerdes Province, Algeria). The students were asked to provide solutions to the following issue: Hatred can destroy societies. What should be done to fight it in our society?

VII-1- Description of the Experiment

Two groups are included in the experiment: A control group and an experimental group. The control group represents the students who did the task without being taught and explained Polya's model of problem solving. On the other hand, the experimental group includes the students to whom Polya's model of problem solving was taught and explained. In this context, it is to be remembered that Polya's (1957) model includes such steps as a way towards solution generation: (1) *Understand the problem*, (2) *Devise a plan*, (3) *Carry out the plan*, and (4) *Look back*.

The control group represents the papers whose total number is 30. On the one hand, the papers of the control group are labeled with **0** indicating no application of the method. On the other hand, the experimental group includes a total number of 36 papers. In the findings, the papers of the experimental group are labeled with **1** indicating application of the method. Table 22 represents the papers' numbers, the application of the method, the marks given by teacher one, the marks given by teacher two, and the mean.

VII-2- Presentation of the Findings

It is to be indicated that the control group includes papers **from 1 to 30**, whereas the experimental group includes papers from **31 to 66**.

Table 32

Results of the Experimental and Control Groups

Number	The Application of the Method	Results by Teacher One	Results by teacher two	The Mean
1	0	6.00	7.50	6.75
2	0	7.00	7.00	7.00
3	0	5.50	4.50	5.00
4	0	4.00	5.50	4.75
5	0	8.50	6.50	7.50
6	0	9.00	10.00	9.50
7	0	5.00	8.50	6.75
8	0	7.50	6.50	7.00
9	0	7.00	9.00	8.00
10	0	9.50	10.00	9.75
11	0	8.00	4.50	7.00
12	0	2.00	3.00	2.50
13	0	5.00	6.00	5.50
14	0	7.00	8.50	7.75
15	0	11.00	8.50	9.75
16	0	9.00	6.00	7.50
17	0	8.00	5.00	6.50
18	0	5.50	6.50	6.00
19	0	10.00	9.00	9.50
20	0	9.00	7.50	8.25
21	0	8.00	8.50	8.25
22	0	7.50	9.00	8.25
23	0	6.50	6.00	6.25
24	0	6.50	7.00	6.75
25	0	4.00	4.50	4.25
26	0	3.00	4.00	3.50
27	0	6.50	6.00	6.25
28	0	6.00	5.00	5.50
29	0	10.00	7.00	8.50
30	0	6.00	4.00	5.00
31	1	10.00	10.00	10.00
32	1	10.00	10.00	10.00
33	1	7.00	7.00	7.00
34	1	12.50	8.50	12.00
35	1	8.50	5.50	7.00

36	1	13.00	8.50	12.50
37	1	6.00	7.00	6.50
38	1	12.00	12.50	12.25
39	1	10.00	10.00	10.00
40	1	11.50	11.00	11.25
41	1	9.50	11.50	10.50
42	1	10.00	8.00	9.00
43	1	8.00	9.00	8.50
44	1	11.50	10.00	10.25
45	1	10.50	7.50	9.00
46	1	5.00	7.00	6.00
47	1	7.50	5.00	6.25
48	1	10.00	7.00	8.50
49	1	10.00	8.50	9.25
50	1	11.00	8.50	9.25
51	1	12.50	10.00	11.25
52	1	07.50	8.00	7.75
53	1	10.00	9.00	9.50
54	1	9.00	11.00	10.00
55	1	10.00	5.00	7.50
56	1	8.50	10.00	9.25
57	1	8.00	7.00	7.50
58	1	9.00	9.00	9.00
59	1	11.00	12.00	11.50
60	1	11.50	11.00	11.25
61	1	5.00	5.00	5.00
62	1	5.50	6.00	5.75
63	1	9.00	11.00	10.00
64	1	7.50	10.00	8.75
65	1	8.50	10.00	9.25
66	1	8.00	10.00	9.00

Nb. It is to be mentioned the following papers have been corrected by a third teacher because of the disparity of the original marks given by the first and the second teachers:

Table 33

The Papers that Have Been Corrected by a Third Teacher

Papers' Number	The Application of the Method	Results by teacher One	Results by teacher Two	Disparity	Results by Teacher Three
11	1	8.00	4.50	3.50	7.00
34	1	12.50	8.50	4.00	12.00
36	1	13.00	8.50	4.50	12.50
55	1	10.00	5.00	5.00	7.50

Table 34

Explorer of the Statistics

Remarks

The output obtained	10-JUL-2023 11:07:23	
Comments		
Entry	Data	E:\Without Title2.sav
	The active data set	Set_of_data1
	Filter	<without>
	Weighting	<without>
	Split a file	<without>
	N of the lines in the work file		66
Management of the missing value	Definition of the missing value	The missing values defined by the user for the dependant variables have been processed as missing.
	Observations used	The statistics are based on observations deprived from missing values for all the dependant variables and the factors used.
Syntax	EXAMINE VARIABLES=No App Met /ID=The Application of the Method /PLOT BOXPLOT HISTOGRAM /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING LISTWISE /NOTOTAL.	
Resources	Processor time	00:00:00.99
	Elapsed time	00:00:00.81

Table 34 displays the datasets that have been explored to analyse the data of the two groups involved in the experimentation. Indeed, the table presented the principles of calculating metrics in terms of entry, syntax, and resources. The table, too, displays the application and non-application of the method. The former regards the experimental group and the latter deals with control group. In the findings, one can see that the missing value has been taken by the user as missing. The main causes of the missing value are tied to human errors and incomplete entries. In such a way, the analysis of the finding is not going to be biased, and that accuracy and validity are ensured and stressed, so that accurate conclusions valid results can be effectively reached and produced. In Table 34, for example, all the active data are present in the sense that the marks of both the experimental and control groups have been processed and entered in that the statistics are based on observations deprived from missing values for all the dependant variables and the factors used.

Table 35
Summary of the Observations Processing

	Valid		Missing		Total	
	N	Percentage	N	Percentage	N	Percentage
No Application of the Method	30	45.5%	36	54.5%	66	100.0%
Application of the Method	30	45.5%	36	54.5%	66	100.0%

Table 35 displays the data conglomerating the number of the students involved in the control group and which is 30, as well as that involved in the experimental group and which is 36. The students involved in the control group represent 45.5% of the total population, whereas

those involved in the experimental group represent 54.5% of the total populations. The total number of students combining both control and experimental group is 66. This number corresponds to the total percentage which is 100.0%.

Table 36**Descriptives of the Statistics of the Experimentation**

		Statistics	Standard Error	
No Application of the Method	Mean	6.8250	,33200	
	Confidence Interval of 95 % of the mean	Lower Bound	6.1460	
		Upper Bound	7.5040	
	Mean trimmed at 5 %	6.8843		
	Statistical Median	6.8750		
	Statistical Variance	3.307		
	Standard deviation	1.81843		
	Minimum	2.50		
	Maximum	9.75		
	Statistical Range	7.25		
	Interquartile Range	2.75		
	Statistical Asymmetry	-.348	,427	
	Statistical Kurtosis	-.095	,833	
Application of the Method	Mean	9.4500	,32350	
	Confidence Interval of 95 % of the mean	Lower Bound	8.7884	
		Upper Bound	10.1116	
	Mean trimmedat5 %	9.4676		

Statistical Median	9.6250	
Statistical Variance	3.140	
Standard Deviation	1.77191	
Minimum	6.00	
Maximum	12.50	
Statistical Range	6.50	
Interquartile Range	2.56	
Statistical Asymmetry	-.219	.427
Statistical Kurtosis	-.707	.833

As displayed in Table 36 the confidence interval in both the control group and experimental group is 95 %. This shows that the method has 95% of chances to reproduce the true value of the unknown parameter. In addition, the findings suggest that the mean in the control group is 6.82 out of twenty, whereas in the experimental group is 9.45 out of twenty, suggesting that neither the mean of the control nor that of the experimental groups are average or above the average. In addition, the statistical median (the center of the distribution of the means) of the control group is 6.87. On the other hand, the statistical median of the experimental group is 9.62. Moreover, Table 36 indicates that the statistical variance of the control group is 3.30, whereas in the experimental group it is 3.14. The variance is obtained by assembling the square deviation of each value and then the sum then is divided by the number of the values in control is 30 and in the experimental one is 36. Furthermore, the standard deviation in the control group is 1.81 and in the experimental group is 1.77. Finally, the results show that the minimum value in the

control group is 2.5 out of 20 and the maximum value is 9.75 out of 20. On the contrary, the minimum value in the experimental group is 6 out of 20 and the maximum value is 12.50 out of 20. As for the grid used to get the results, see the methodological chapter (p.,124)

Histogram

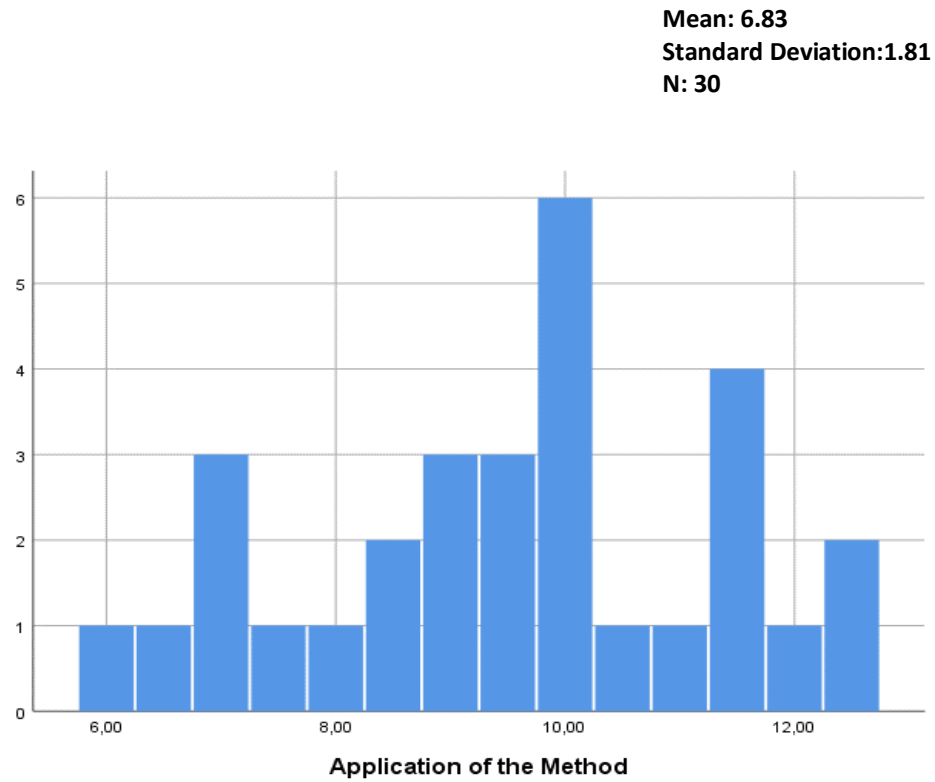


Figure 23. Results of the Control Group in Terms of Mean and Standard Deviation

Figure 23 indicates that the mean of the control group is 6.83 out of twenty, and the standard deviation is 1.81. The majority of the students obtained a mean that stretches between 6 and 8 out of twenty. This suggests that the students' performance is to be qualified as being weak. More importantly, there are even students whose means range between 2 and 4 out 20. This is a strong indicator of the students' weak performance as far as the resolution of problems is concerned. More details about the analysis of such findings will be provided in the discussion part of the current chapter.

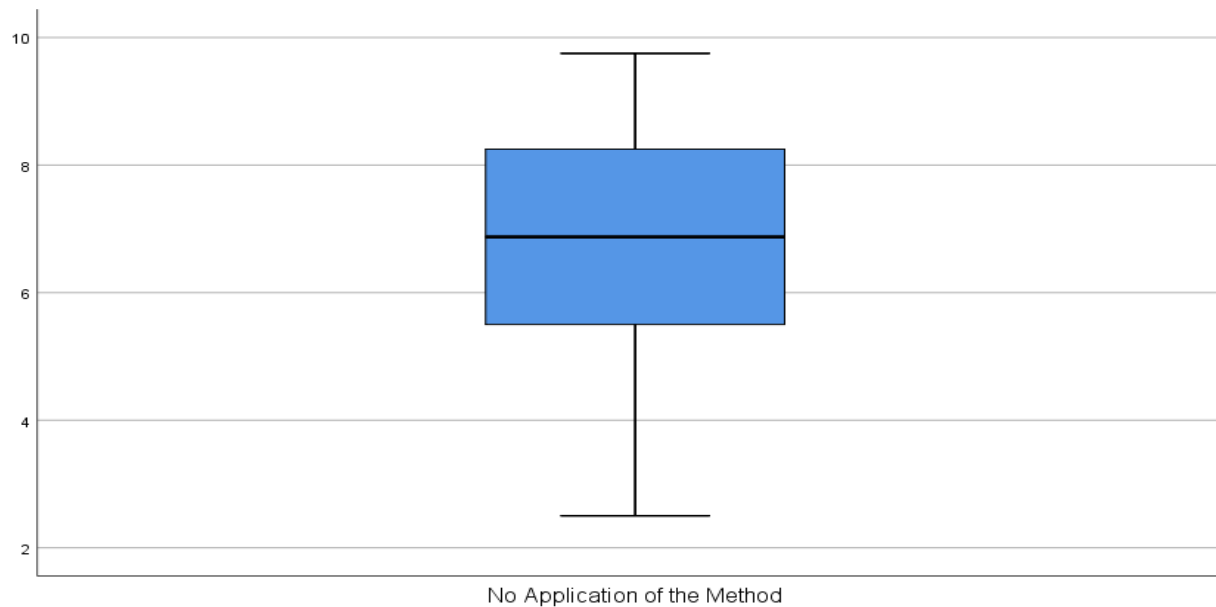


Figure 24. Results of the Control Group in Terms of Mean

As Figure 24 indicates the mean of the control group is between 6 out of twenty and 8 out of twenty. That is, all the students of the control group did not reach the average. Conversely, students of the experimental group demonstrated better performance as some of them reached the average. Additionally, a very few students obtained means that go between 8 and 10 out of 20. Another point to be mentioned is that there are students even a few who marked the average that is less than 6 out of 20.

Histogram

Mean: 9.45
Standard deviation: 1.77
N: 30

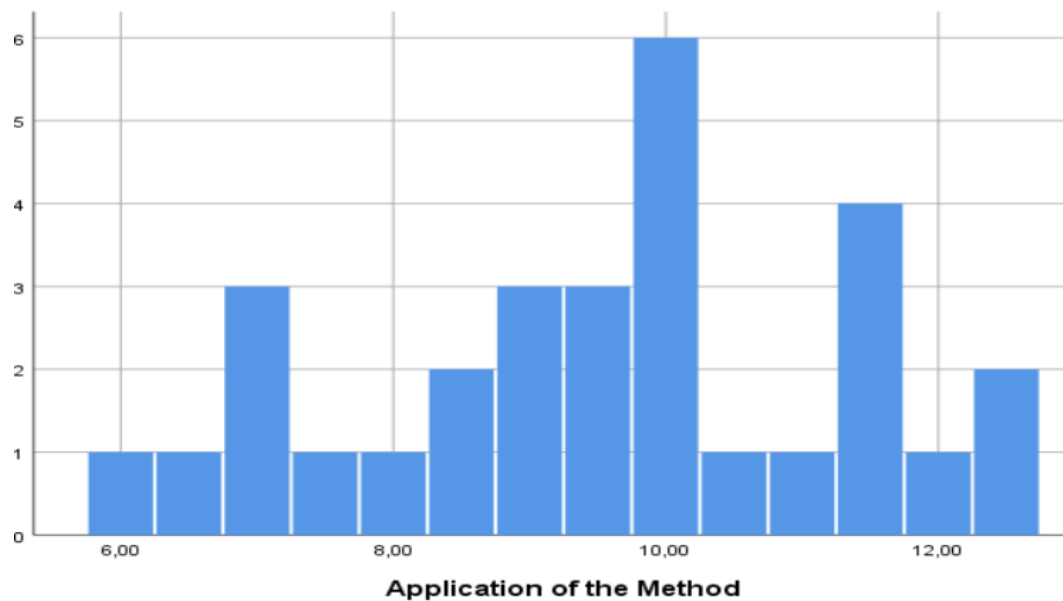


Figure 25. Results of the Experimental Group in Terms of Mean and Standard Deviation

In the histogram about No Application of the Method indicates that the majority of the papers include scores between 6 and 8 and in the application of the method indicates that the majority of the papers are scored between 8 and 10. The standard deviation in the experimental group is 1.77. In addition, it is indicated in the histogram that the mean of the experimental group is 9.45 out of twenty and the standard deviation is 1.77. This implies that the majority of the students that were involved in the experimental group did not reach the average.

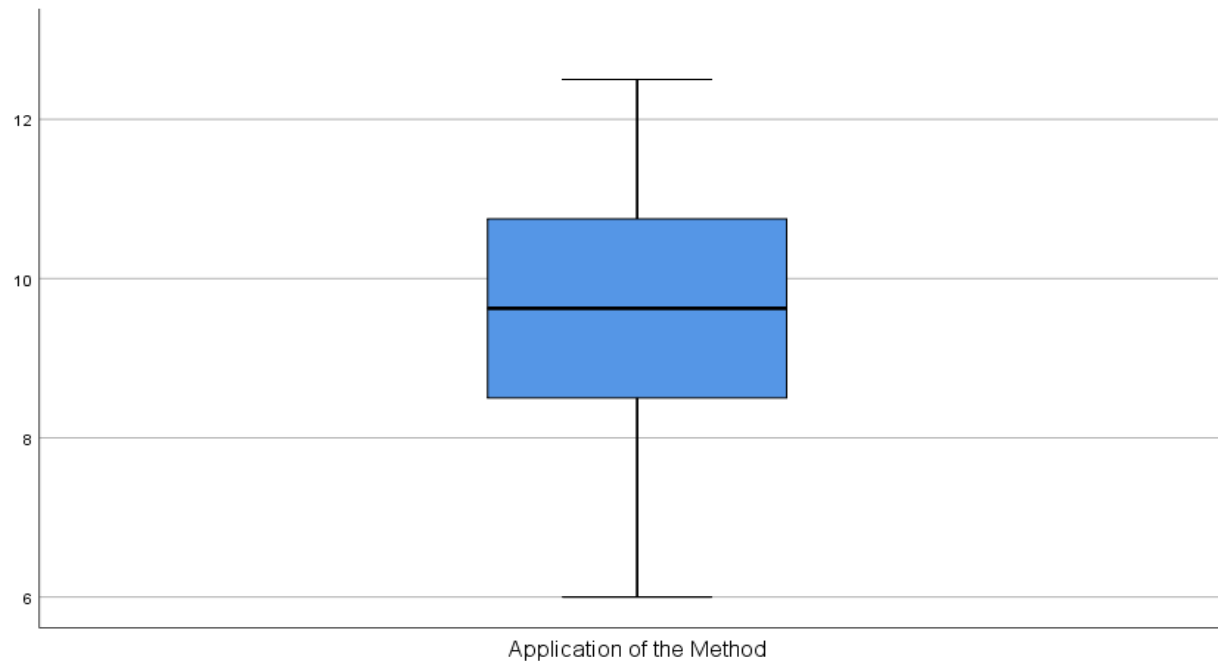


Figure 26. Results of the Experimental Group in Terms of Mean

Figure 26 indicates that the mean of the experimental group is near 10. Additionally, the findings suggest that there are students, even a few, who obtained a mean that is more than 10 out of 20. The majority of students did not reach the average; that is, their marks are below 10 out of twenty. The findings, then, can be viewed as chiefly representing the category of ‘lower-achieving students’. Conversely, the category of ‘average-achieving students’ is rare, and that of ‘higher-achieving students’ is totally inexistent.

Table 37

Results of the Test T

		Group Statistics			
The Application of the Method or no application					
		N	Mean	Standard Deviation	Mean Standard Error
Mark Obtained	0	30	6.8250	1.81843	.33200
	1	36	9.2153	1.87764	.31294

In **Test T (Levin Test)**, the findings about the application or no application of the method (Polya’s model) indicate that the scores obtained by the students who did not receive the application of the method, that is those of the control group, indicates a mean of 6.82 with a standard

deviation of 1.81 , whereas the scores obtained by the students who received the application of the method indicate a mean of 9.21 with a standard deviation of 1.87.

Table 38

Test of the Independent Samples

		Levene Test on variances equality		Test t for means equality						
		F	Sig.	t	ddl	Sig. (bilateral)	Differencmean	Difference standard error	Confidence Interval of 95 % of the mean	
									lower	Higher
Mark Obtained	Hypothesis of the equal variances	,030	,863	-5.224	64	,000	-2.39028	,45759	-3.30442	-1.47613
	Hypothesis of the unequal variances			-5.239	62.527	,000	-2.39028	,45624	-3.30213	-1.47842

Table 38 displays the test of the independent sample. Indeed, the data suggest that the difference mean is -2.39 . In addition, the results indicate that lower confidence interval is -3.30 , whereas the higher confidence interval is -1.47 . Additionally, the findings show that the difference standard error is -3.30 . This means that the difference between the mean of the experimental group which is 9.21 and that of the control group which is 6.82 is -2.39 .

VII-3- Discussion of the Findings of the Experimentation

The experiment involved two groups: A control group and an experimental group. The control group included 30 papers (N 30) representing 100 % and the experimental group included 36 papers (N36) representing 100 %. The focal aim of the experiment was to test the impact of Polya's problem solving model on EFL students' problem solving performance through writing.

The results of Test T in Table 37 show that the control group obtained a mean of 6.82 with a standard deviation of 1.81. On the other hand, the experimental group scored a mean of 9.21 with a standard deviation of 1.87. A critical consideration of the two means offers clear insights into the weak level of the two groups even if the experimental group obtained a better mean. This implies that much work should be done to improve the students' problem solving skills. This can be treated by making reference to Whimbey and Lochhead (1999) regarding the traits of good problem solvers in terms of: 'positive attitude' 'concern for accuracy', 'breaking the problem into parts', 'avoidance of guessing', and 'activeness in problem solving.'

The scores obtained by the control group stretch between 6 and 8 out of 20 (See Figure 24). Conversely, the scores obtained by the experimental group range between 8 and 10 out of 20 (See Figure 26). This corroborates the findings reached Kök and Duman (2023) that the application of problem based learning improved the problem solving skills of the experimental group in comparison with the control group to which problem based learning was not applied. An analysis of such a case suggests that efforts should be oriented towards supporting students to actively get engaged in solving academic reasoning problems (Whimbey & Lochhead, 1999; Jonassen, 2011) that would trigger students' thinking skills in terms of 'analysis' and 'evaluation.'

In Table 36 about the descriptions of the statistics, it is mentioned that in the control group the maximum score is 9.75 out of 20 and the minimum score is 2.50 out of 20. Oppositely, in the experimental group, the maximum score is 12.50 out of 20 and the minimum score is 6.00 out 20. This corroborates with Ugyen and Dema's findings (2019) writing "The overall results of the study revealed that Polya's Problem-Solving Model increased the learning achievement and improved analyzing skills of fourth grade students at mathematics" (p.6). In the same context, articulating on the effectiveness of Polya's model, Obiano and Parangat (2023) assert that "the respondents agreed that Polya's Theory is effective in improving problem solving ability in terms of understanding, planning, implanting and look back" (p. 117). An explanation of this is that Polya's model is a four-step process, whose the beginning is fundamentally linked to understanding that is meant to pave the way to the solver to effectively handle the remaining steps of the problem-solving journey.

In Table 36 about the descriptions of the statistics, the data show that in the control group the difference (the data range) between the maximum score (9.75) and the minimum score (2.50) is 7.25. On the other hand, in the experimental group, the difference (the data range) between the maximum score (12.50) and the minimum score (6.00) is 6.50. This indicates that homogeneity in the experimental group is more important than in the control group. In this context, the variance in the test is different in the control and experimental groups. In the control group, the variance is 3.30 and in the experimental group, it is 3.14. The findings suggest that in the control group the standard deviation is 1.81, whereas in the experimental group it is 1.87. This suggests that in the experimental group the value is closer to the mean than in the control group. It can be inferred from such results that the students did not exhibit high academic standards in problem solving. This goes in line with what has been found by Hooijdonk et al. (2023) that creative problem solving model stressing divergent and

convergent thinking can be used among students to improve their problem solving skills. Subsequently, stress should be put on the enhancement of students' cognitive skills adopting a range of thinking frameworks, such as Bloom's Taxonomy, Quellmalz's Taxonomy and Marzano's Taxonomy (See Moseley et al., 2005).

In Table 38 entitled Test of the Independent Sample, the mean difference between the scores of the control group and those of the experimental group is 2.39. Accordingly, in the test we notice that the mean difference is significant ($p < 0.0005$). This indicates that the application of the method had a positive impact on the students' problem solving performance. Cautiously speaking, however, a deep analysis of other factors that would impact problem solvers' performance in terms of context, background knowledge, motivation, and teaching and testing practices is required (Duch et al., 2001; Jonassen, 2000, 2004; De Corte; 1990). The disparity that exists between the scores obtained by the control group and those obtained by the experimental group is a strong indicator of the positive impact of Polya's model on the students' problem solving performance. Indeed, the marks of the control group give a mean of 6.82, whereas those of the experimental group indicate a mean of 9.21. Accordingly, the disparity has a value of 2.39, which is, in fact, significant ($p < 0.0005$).

The findings indicate that out of thirty (30) participants in the control group, there were any (0) or 00% students whose ratings were average or above the average. Conversely, the data show that out of thirty-six (36) participants in the experimental group, there were fourteen (14) or 38.88% whose scores were from 10 to 12.50 (see Table 32). A possible explanation of this is that the understanding phase of Polya's problem-solving model allowed and helped the students to gain a kind of concentration and clarity regarding the meaning of the problem statement Ericsson (2003). The information to be collected thereafter could be said to be stemmed from effective decision making regarding the relevance of the data to incorporate in the solution generation process. Additionally, the second phase 'Make a plan'

might have let the students proceed in the organisation of data in a systematic and organised way. In this vein, Robert Sternberg (1985) in his triarchic theory of human intelligence considers planning as one of the meta-components that guide problem solving, in addition to monitoring and evaluating. By stress the components the students could become more successful in performing creative and complex problem solving tasks.

Illustrations from Papers belonging to the control group are provided so that to make things clearer and make the analysis more valid and reliable. Indeed, one can read from paper one the following:

There are many things that cause hate like jealousy or comparatively more having like beauty, money or anything else, and also sometimes wrong understanding between people cause hate.

But the damaging effects of hatred are so powerful that they erade (eradicate) the human spirit as powerfully as any chemical toxic. (See Appendix 4, Paper No. 1)

The analysis of the student's answer suggests that the student did not get the right meaning of the problem. Being as such, the answer was not written stressing the importance of Polya's model first step 'understanding the problem'. In addition, instead of providing solutions to the raised issue the student focused on explaining the cause of hatred and its damages. Though these can be viewed as part of understanding of the problem, they were not exploited in the way to reach the phase of solution generation.

Another illustrative example is taken from **paper number Six (See Appendix 4, Paper No. 6)**. The student started explaining the main reasons of hatred and ended with a paragraph displaying his/her suggestions to fight hatred in our society. In fact the student wrote:

The best way to overcome hate is by asking yourself why? Why am I hating that or this or him or her? Just why and then you will find that all that hate was for nothing and for no reason and even if there were a reason you will realize that you really don't have to hate it or is just not worth hating it.

The student manifested an understanding of the issue. This allowed the student to go through the problem solving phases set by Polya, namely problem understanding. This said,

the student, however, did not go deep in explaining other important solutions to be generated in fighting hatred. The element ‘Look back’ could have driven the students to make right decisions about the quality of their performance. In this regard, Zimmerman and Campillo (2003) clarify that there exist four key kinds of criteria that people employ to assess their problem solving: ‘mastery’, ‘previous performance’, ‘normative’, and ‘collaborative’

In addition, the following is an illustration of the way the student provided a solution to the problem of hatred:

Hatred !!! This word is widespread in our countries and it is a real phenomenon which is a negative feeling and it can destroy many societies, for this purpose we must think about solutions to extradite it and what are the causes and the effects of this problem? When we look around us we find a lot problems between brothers cause (because) of heritage for example or money and also we find it between friends and it can be jealous (jealousy)

So, we conclude that this phenomenon is very dangerous and we should find some solutions to diminish or we can say to stop it, we can teach our children in the schools and we tell them that it is bad and unethical and it can destroy their personality and we ought to sensitize people of this danger word. (See Appendix 4, Paper No. 15)

The basic solution the student provided was education hand in hand with sensitizing people about the dangers of hatred. This can be viewed as a strong solution. The visible weakness in the student’s answer is that he/she did not delve into deep analysis stressing higher-order thinking skills like those included in Bloom’s Taxonomy, Quellmalz’s Taxonomy and Marzano’s Taxonomy. The student’s answer, accordingly, can be qualified as being shallow in that it lacks one of the key tenets of critical thinking ; that is, ‘depth’ (Elder & Paul, 2012).

Moreover, shallowness is the basic feature of the following production taken from **paper No. 19 (See Appendix 4).**

Hatred is a phenomenon which is very harmful in our societies. It can destroy them, and causes many problems.

At first, hatred has many causes like: jealousy, malice, indifference when I jealouse someone I hate him If I am malicious I hate the others The cause can be also heritage.....

Finally we should stop this phenomenon by many solutions: do not let someone else manipulates I into being miserable. All of us need to understand that the only real solution is not more hate, but it is love, compassion, understanding and unity with our fellow humans.

As one can see the student did not provide an analytical answer. Indeed, the student stuck to a list including: love, compassion, unity and understanding as solutions for hatred. Though the terms represent the foundational keys to the solution, no critical analysis has been provided. The answer then lacks ‘depth’ and ‘breadth’ (Elder & Paul, 2012), as well as the advanced thinking levels of Bloom’s Taxonomy in terms of Quellmalz’s Taxonomy and Marzano’s Taxonomy in terms of ‘analysis’ and ‘evaluation’. Moreover, the components ‘devise the plan’ and ‘implement the plan’ could have served as tools for the students to feel a kind of active involvement and concrete application of strategic knowledge. In this sense, Halpern (1984) names it ‘willingness to plan’ as a critical thinking disposition (as cited in Moseley et al., 2005, p. 145).

Like the previous excerpts, the following example taken from **paper No. 20(See Appendix 4)** reflects a simple answer that does not mirror critical reasoning or critical thinking as key components in effective problem solving:

Hatred feels like such a strong emotion, but it leaves you weakened. Loving kindness might be the answer. Hatred is a negative feeling can be destroy society and lead to war.....

To conclude, these emotions are very danger so to eradicate it we should teach pupils, women and even men that’s mean that all the humanity should learn that love is very important in each other.

Another illustrative case was taken from paper **number 25 (See Appendix 4)** on which the student displayed the following answer to the raised issue

Hatred is a dangerous and negative feeling in societies. Many people hate other persons in all the world, but the question “why hatred can destroy societies? Is remains.

This feeling have a lot of causes like jealousy

The answer provided by the student is a strong indicator that all the problem solving phases incorporated in Polya’s model were not emphasized all along the student’s answer. In fact, the student even changed the original issue requiring him/her the actions to be taken in order to

fight hatred in our society to writing something else which is “why hatred can destroy societies?”

A deep analysis of the students’ answers informs about the great efforts to be made in teaching them the appropriate ways to solve problems effectively in EFL. This can raise awareness about the way students take things for granted in that they did not demonstrate enthusiasm in generating creative solutions to the problem. In this regard, Zimmerman and Campillo(2003) report that implementation of solution strategies represents one of the core tents of effective problem solvers.

The analysed excerpts point towards teachers’ responsibility to enlighten their students about the importance of understanding in problem solving (Polya, 1967; Bransford & Stein, 1993; Sternberg, 1999). Being the first necessary step in solving problems, its neglect impedes all the process leading to solution generation. The problem solving models mentioned in the literature review could be used to provide the students with the fundamental tools allowing them to become effective problem solvers in EFL.

Other examples to support the analysis are taken from the experimental group that received the explanation of Polya’s model. The following is an excerpt taken from **paper No.**

38 (See Appendix 4):

Yes hatred is really a virus, it has caused enough trouble in the past few years, but enough with that, and like every problem, hatred has its solutions which are: People should be sensitized about the importance of love and to be reminded of the sweeter feeling that love gives to a person. Help spread peace in the society for it is the best and purest feeling in humanity. Hate must be countered with acts of goodness, love the people around, love your friends, your family, love your country, for a true patriot fights hatred.....

The student managed to provide solutions to the issue mentioning individual and collective responsibilities to be taken in fighting hatred in our society. This reflects the student’s awareness about the existence of such a destroying problem among people. The understanding of the problem exhibited by the student in his writing could be stated as the key factors that allowed the student to think about the solutions he/ she provided. Interestingly, the

student's performance could be better if he/ she emphasised the evaluation of his/her performance as Halpern (1984) names it 'willingness to evaluate' as a critical thinking skill (as cited in Moseley et al. 2005, p. 145). The importance of evaluation lies in the fact that it has two critical attributes. First, it invites the students to use their critical thinking capacities so that to differentiate between what is right and what is wrong relying on their background knowledge. Second, evaluation is a metacognitive component that reflects responsibility and intellectual maturity. In a nutshell, evaluation is a strong indicator of autonomous and active learning.

Additionally, the following example from the control group shows the need to teach students effective problem solving:

It is high time people found solutions to this phenomenon ; we ought to sensitize people about this evil and we should advice them to leave this ideas behind them people have to respect the others opinions and(Paper No. 39, Appendix 4)

Another illustration is taken from **paper No. 48 (See Appendix 4)**. Indeed, the students produced the following writing:

*Hatred can destroy societies, How? I say by their effects.
Some people find it normal to hate one another but the most important is that they let this word "hate" begin living in their hearts, and day after day, because of hatred, people lose love, help and the good relations between them.*

In order to fight hatred, we need love for the good, we need to help everyoneand we need to respect ourselves and every one another. The bad cannot never fight another bad just the good fight and kill the bad.

The analysis of the student's answer provided hints regarding his/her understanding of the problem even if the student started with a statement that could be taken as a deviation from the original meaning of the issue. This said, the student nevertheless managed to enlighten some points regarding the solutions to be taken into account to fight hatred. For instance, the student mentioned love and mutual respect as the means to be stressed in order to fight hatred. In brief, it can be said that the student respected Polya's model even only partially. In relation to this point, Jonassen (2004) asserts that it is fundamental for students to

comprehend the various perspectives that render problems of particular cases complex so that produce and assess different solutions.

Another example is taken from **paper No. 51(See Appendix 4)** on which it is mentioned:

We must fight hatred because it can destroy societies, so we have to be mature and accept others like they are, respect their thoughts, understand their pain and giving help to everyone they need it. We should open hearts and choose to be happy and keep hand in hand to build our society, not destroy it.

The student managed to mention the way to follow in order to fight hatred. In addition to being maturity, respect, and responsibility, the student mentioned love as a strong weapon to use to fight against hatred (**See Appendix 4, Paper No. 51**). The student in the beginning of his/her writings displayed understanding of the problem. Accordingly, it could be stated that the student went through the problem solving phases included in Polya's model though superficially; that is, the performance lacks deep analysis and creative solution generation.

An extra example regarding students' performance in relation to problem resolution is taken from the experimental group (**Paper No. 58, See Appendix 4**):

Hatred is feeling of one who hates, intense dislike or extreme aversion or hostility, that feeling can cause great damages in our society.

The principle cause of hatred is the wrong education of children, because parents them how they hate not how they love and live in peace. So, education and the breeding of children are the base to build perfect society.....

The only solution to stop hatred is to teach our children how they love and how they collaborate with others to live in peace and love without any violence or heating.

To build elegant and cultured society and perfect country we must take care and love our children.

As a solution, the student mentioned education, love and collaboration. This could be viewed as a signal of understanding and a good solution. Nevertheless, the students' answer lacks deep analysis and criticality. This indicates the necessity to stress the teaching of problem solving and higher-order thinking skills in EFL in the Algerian Secondary schools exams classes.

An important finding in the experiment is that the best mark in the control group was 9.75 out of twenty (20) (see Table 32). Shaped differently, the students did not score good marks at all. This may be due to the fact that the students did not have background knowledge and they did not follow the strategies of effective problem solving like Polya's model. Thus, a coalescence explanation of the situation covers students' lack of background knowledge, as well as their lack of problem solving skills and strategies. For example, Bailin (1998) considers background knowledge as one of the intellectual resources of critical thinking (as cited in Moseley et al., 2005, p. 177). In the same line of thought, Halpern (1984) coins background knowledge with a question: What is known? This is at the second stage of her framework of critical thinking skills including 1. What is the goal? 2. What is known? 3. Which thinking skills will get you to your goal? And 4. Have you reached your goal? (as cited in Moseley et al., 2005, p. 145). The four components essentially rest on mental efforts that can be directed towards generating solutions focusing on problem understanding, implementation and evaluation of alternatives, using an approach that allows putting all that in a harmony.

It is to be mentioned that the lowest mark in the control group is 2.50 out of twenty (20). Given that the student did not make effort to get a good mark, the evidence to be provided to explain such a case is that the student did not get the meaning of the problem statement; neither had the necessary problem solving skills. In addition, the student, like those who did not reach the average, was not equipped with the 'know-how to do' that would trigger his/her autonomous and creative actions. Explained in a converse manner, the majority of students in the control group could have attained an acceptable standard of performance without being expert problem solvers.

The performance of the students of the experimental group, as it has already been mentioned, is better than those of the control group. Nevertheless, this does not mean that the

scores of the experimental group reflect mastery in problem solving. In fact, the data demonstrate that the best mark in the experimental group is just 12.50 out of twenty (20) getting a qualification of 'quite good'. Thus, one can see how none of the students of the experimental group obtained a mark to be qualified as being 'very good' or 'excellent'. A possible explanation of that might be the students did not get the chance to frequently handle problem-solving tasks. Added to this, the environment, possibly, was not encouraging and stimulating so that the students would create solutions to problems successfully, pivotal role that the environment plays in fostering problem solving (Lubart & Mouchiroud, 2003), as well as the role of a motivational context in fostering life-long learning like problem solving (Grunert O'Brien et al., 2008). This is because in order to be effective in solving problems, the students' cognitive abilities in terms of higher-order thinking skills and their communication skills must be called into play at appropriate points in an environment that puts stress on the priority of the constructive and creative solution generation process.

The data obtained (see Table 23) suggest that the **standard deviation** in the control to which the method was not applied is 1.81, whereas in the experimental group **the standard deviation** is 1.77 (See Table.25). As an interpretation of this, one can see that the standard deviation (the gap) between the scores of the control group is larger than that of the scores of the experimental group. The gap, however, is quite slight (0.04). This means that the larger the standard deviation the further the scores to the average. Said differently, the marks of the control group are further than those of the experimental group to the average (10 out of 20). Indeed, Figure 24 shows that the majority of scores of the control group are between 6 and 8, whereas the majority of the marks in the experimental group are between 8 and 10 (See Figure 26). A deep analysis of such situation allows to state that being six times exposed to Polya's model, the students in the experimental group were given the chance to harmoniously approach the problem solving task; something that the control group did not receive.

One reason that the students in the experimental group performed more homogeneously than those of the control group could be stemmed from the greater sense of self-efficacy beliefs that the exposure to Polya's problem solving model brought about in the students of the experimental group. In this vein, Schunk (1996) argues "positive self-satisfaction reactions strengthen self-efficacy beliefs about eventually solving the problem, enhance learning goal orientations" (as cited in Zimmerman & Campillo, 2003, p. 246). This remains, however, a hypothetical explanation of the situation. Consequently, a more valid justification of the data requires further exploration of the reasons of the students' performance. This can, for example, include students' self-confidence, students' anxiety, students' background knowledge and intelligence.

Conclusion

The present chapter has tackled the impact of Polya's model on the students' problem-solving performance using experimentation. Two groups have been included in the experiment: A control group and an experimental group. The control group represented the students who did the task without being taught and explained Polya's model. Conversely, the experimental group represented the students who did the task after being taught and explained Polya's model of problem solving during six weeks. The control group included 30 papers (N 30) representing 100 % and the experimental group included 36 papers (N36) representing 100 %. In **Test T**, the findings about the application or no application of the method (Polya's model) has indicated that the scores obtained by the students who did not receive the application of the method, that is those of the control group, indicated a mean of 6.82 with a standard deviation of 1.81, whereas the scores obtained by the students who received the application of the method indicated a mean of 9.21 with a standard deviation of 1.87. It was mentioned that in the control group the maximum score was 9.75 out of 20 and the minimum score was 2.50 out of 20. Conversely, in the experimental group the maximum score was

12.50 out of 20 and the minimum score was 6.00 out 20. As a result, in the test it was indicated that the mean difference was significant ($p < 0.0005$), meaning that the application of the method had a positive impact on the students' problem solving performance.

It ensues from what has been discussed, the answer to the fifth research question: Does Polya's problem solving model have impact on the students' problem solving performance? Is the following: Yes, the application of Polya's problem solving model has an impact on the students' problem solving performance.

Accordingly, hypothesis five H_0 (null hypothesis): **The application of Polya's problem solving model does not have impact on students' problem solving performance** has been refuted.

GENERAL CONCLUSION

Throughout the present study, the issue of problem solving in English as a foreign language (EFL) has been investigated from a socio-constructivist perspective. The context of the study has been the Algerian third-year secondary school classes. The study's purpose was threefold: First it attempted to evaluate the EFL textbook *New Prospects*, the Third-year SS EFL program, and the EFL Baccalaureate examinations (Second subject, Stream Literature and Foreign Languages) designed from 2010 to 2024 in terms of problem solving. The second study's aim was set to figure out whether the EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom, as well as the different emerging roles and responsibilities associated with the teachers' views towards problem solving. The final aim was set for the sake of conducting an experimentation to figure out the impact of Polya's problem-solving model on the students' problem solving performance.

The methodology adopted in the study has three parts: EFL materials evaluation, a survey, and experimental research. A set of frameworks have been integrated to carry out the research. Firstly, for the evaluation of the textbook Bloom's Taxonomy (1956) and Quellmalz's (1989) taxonomy have been used. Secondly, the 3C3R Model: A Conceptual Framework for Designing Problems in PBL (Problem-Based Learning) by Hung (2006) has been adopted for the evaluation of the curriculum. Thirdly, Cognitive Flexibility Theory set by Spiro et al., (1988) was chosen for the evaluation of the EFL BAC exams to find out whether they stress students' cognitive flexibility to solve complex problems. As regards the assessment of the EFL teachers' views and attitudes towards problem solving, a questionnaire grounded on Marzano's New Taxonomy (2001) has been selected. Finally, the framework that has been implemented to conduct the experimentation was Polya's (1965) problem solving model.

To investigate the issue raised, five research questions and hypotheses were put forward. Indeed, the study has been conducted searching answers to the following:

- 1/ Do the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in The Algerian Secondary School cater for problem solving in a satisfactory way?
- 2/ To what extent do the EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom?
- 3/What are the different emerging roles and responsibilities to be associated with EFL teachers' views towards problem solving?
- 4/ Do the EFL BAC Exams account for the EFL learners' cognitive flexibility to solve complex problems?
- 5/ Does Polya's problem solving model have impact on the students' problem solving performance?

The corresponding hypotheses to the research questions in terms of confirmation or rejection have been presented. First of all, the first hypothesis: Yes, the *New Prospects* assessment parts and the EFL program designed for Third-year Classes in The Algerian Secondary School cater for problem solving in satisfactory way has been refuted. Additionally, the second hypothesis: The EFL teachers' answers signal pedagogical awareness of the crucial role of problem solving in the classroom to a lesser extent has been rejected. Besides, third hypothesis: The different emerging roles and responsibilities to be associated with EFL teachers' views towards problem solving include: the enhancement of the students' learning and the teaching practices has been confirmed. Moreover, hypothesis Four: No, the EFL BAC Exams do not account for the EFL learners' cognitive flexibility to solve complex problems has been confirmed. Finally, hypothesis five H_0 (null hypothesis): Polya's problem solving model does not have impact on students' problem solving performance has been refuted.

The findings reached through the evaluation of the learning logs of the textbook *New Prospects* in relation to problem solving have mentioned that 90.76% of the logs do not stress problem solving, whereas 9.24% do. In the same regard, the results of the second assessment part 'skills and strategies assessment' suggest that more than 80% of the activities do not turn around complex problem solving, while less than 20% of them encourage and stress complex problem solving. Accordingly, the parts of *New Prospects* that were subject to evaluation regarding problem solving clarify inadequacies in the integration of problem solving tasks; because the design of the assignments associated with students' assessment are not linked to tasks that stimulate students' deep understanding and creative faculties. The parts, indeed, reflect traditional methods of teaching.

As regards the findings obtained through the evaluation of the curriculum suggest that the elements of the 3C3R Model suggested by Hung (2006): the 'core components', namely 'content', 'context', and 'connection'(3C), and the 'processing components': 'researching', 'reasoning', and 'reflecting'(3R) have been implemented in the curriculum. However, it is important to mention that there are lacks regarding the problem solving components. For example, The 'context component' in the program has been mentioned in a general way without providing particular hints about it, namely , contextual validity, degree of contextualization, and students' motivation. Clearly, the three components are fundamental for effective problem solving in that they help teachers in designing problem-solving tasks that would motivate students to generate creative solutions. In addition, lacks about the 'researching' component are to be mentioned. For example, 'goal specification' and 'context specification' are lacking in the program.

The assessment of the EFL teachers' views and attitudes regarding the implementation of problem-solving tasks in the classroom generated a plethora of information. In fact, almost all the teachers (98%) hold positive views towards the implementation of problem-solving

tasks in the classroom. In addition, the teachers strongly agree or agree with the idea that students should be frequently involved in doing tasks that trigger their creative faculties, namely inference, analysis, synthesis, and evaluation. The teachers also claimed that the students would be more involved in problem solving if the teachers taught them problem-solving approaches like that of Polya. The idea was that the students would follow principles that could allow them to approach novel problems systematically and creatively. The implementation of problem-based learning principles in the classroom has, consequently, viewed positively by almost all the teachers (98%). In brief, the data obtained through the questionnaire clearly indicate the positive views and attitudes that the EFL teachers hold towards the implementation of problem-solving task sin the classroom.

It is shown in the data gathered through the evaluation of the Baccalaureate examinations that 80% of the exams' tasks do not foster problem solving, whereas 20% of the exams' tasks involve problem solving. Being as such, a set of recommendations has been made for the sake of improving the Baccalaureate examinations regarding the issue of problem solving. Of the key recommendations, the researcher suggested the inclusion and implementation of tasks revolving around higher-order thinking skills, namely inference, analysis, synthesis, and evaluation. Similarly, the researcher stressed the importance of deleting any activity that is threat of guessing from the examinations; so that the BAC exams could be designed in the manner that goes in accordance with the testing principle of 'positive washback'.

As too the findings of the experimentation, that was based Polya's model of problem solving, a test included two groups: A control group and an experimental group. 30 students (N 30) representing 100 % were involved in the control group. On the other hand, 36 students (N36) representing 100 % were included in the experimental group. The experimentation's

overall aim was to figure out impact of Poly's problem solving model on the students' problem solving performance through writing.

The findings displayed in Test T about the application or no application of the method (Polya's model) suggest that the marks of the students who were involved in the control group (the group that did not receive the application of the method) reached a mean of 6.82 out of twenty (20), with a standard deviation of 1.81. Conversely, the marks of the students who were involved in the experimental group reached a mean of 9.21 out of twenty (20) with a standard deviation of 1.87.

The results displayed in histogram No about the application of the method indicated that the scores obtained by the control group stretched between 6 and 8 out of twenty (20). Accordingly, the basic explanations that were provided to the situation incorporated students' lack of background knowledge and their non mastery of problem solving methods like that proposed by George Polya (1965).

The data presented in histogram No about the application of the method indicated that the scores obtained by the experimental group stretched between 8 and 10 out of twenty (20). Consequently, the main explanation that was provided to the situation was the Polya's model might have impacted the students' problem solving performance positively, or to some extent the students had better writing performance.

It was indicated in table No about the descriptions that the maximum score obtained by the control group was 9.75 out of 20 and the minimum score was 2.50 out of 20. On the other hand, the maximum result scored by the experimental group was 12.50 out of 20 and the minimum score was 6.00 out 20.

The difference (the data range) between the maximum score (9.75) and the minimum score (2.50) presented in the control group was 7.25. Inversely, the difference (the data range) between the maximum score (12.50) and the minimum score (6.00) presented in the

experimental group was 6.50. A possible explanation that was offered in such a case was that the homogeneity component of the experimental group was more important than that of the control group. The Variance, in this vein, in the test was different in the control and experimental groups. Indeed, the variance was 3.30 in the control group and 3.14 in the experimental group. In addition, it was mentioned that the standard deviation in the control group was 1.81, whereas in the experimental group the standard deviation was 1.77.

The mean difference between the scores of the control group and those of the experimental group mentioned in the table entitled Test of the Independent Sample was 2.39%. This allowed to state that the mean difference of the experimentation was significant ($p < 0.0005$). Eventually, the researcher hypothesized that the application of Polya's problem solving model had a positive impact on the students' problem solving performance. This was mentioned, there, however, many other interpretation that could basically be confined to the students' background knowledge and other psychological parameters that go beyond the scope and objective of the present study.

It is to be highlighted that a set of recommendations and suggestions have been offered to address the lacks spotted through the evaluation of the textbook New Prospects and the curriculum regarding the skill of problem solving. Interestingly, the study has recommended and suggested a set of principles and hints to treat the lacks and weaknesses of the EFL BAC examinations with regard to Cognitive flexibility as a key for complex problem solving. Last but not least, a range of implications of the findings of the experiment has been mentioned.

Recommendations and Suggestions to Policy Makers

First of all, it is important to stress key elements so that the textbook new prospects can be improved in terms of problem solving.

1- It is important to design assessment tasks that stimulate students' creative mind and invite them to solve new problems creatively.

- 2- The inclusion of assessment activities dealing with higher-cognitive skills is of paramount importance in education.
- 3- Assessing students to prepare them handle real-life situations should be stressed.
- 4- The traditional methods of testing whose focus is on discrete-items and on lower-level thinking skills is not efficient, and as a result focus should be on alternative ways of assessment whose main features are performance, communication, and creative knowledge.
- 5- The assessment formats turning around open-ended questions should be valued.
- 6- The students should be given opportunities to take risks, guess, predict, and hypothesize.

In addition, the analyzed findings lay a foundation to provide a set of recommendations and suggestions that could serve as a tool that helps shed light on the program parts to improve regarding the issue of problem solving. Indeed, the recommendations are as follows:

- a) In considering the content component, the criterion of ‘ill-structuredness’ of language problems is to be explicitly and clearly emphasized in the program.
- b) In dealing with the context component of PBL problems, ‘contextual validity’, ‘degree of contextualization’, and ‘students’ motivation’ need to be illustratively stressed in the program.
- c) In examining the connection component, there should be specification of the connections nature in the program with clear hints about how students could establish links between different concepts and parts of knowledge in terms of coherent assemblies.
- d) With regard to the ‘researching’ component, ‘the testing of hypotheses and possible solutions’ should be clearly and illustratively incorporated into the program to encourage the students to reach the stage of self-evaluation and autonomy when considering the validity and effectiveness of their solutions and problem solving strategies.
- e) In analysing the ‘reasoning’ component, practice of testing hypotheses and possible solutions by the students should be clearly and illustratively highlighted in the program. The

students need to be encouraged to develop self-awareness and deep understanding of their own work and level of competence.

f) As to the ‘reflecting’ component, students’ reflection on their problem solving skills should be stressed in the program.

Moreover, the following are suggestions that can be considered for the improvement of the EFL BAC exams (Second Subject) in terms of complex-problem solving.

1/ Stress should be on the testing formats that foster creativity and deep thinking.

2/ The assessment formats that are threat of guessing should be avoided.

3/ The students’ higher-thinking skills in terms of analysis, synthesis, and evaluation should be triggered through open-ended and complex language issues.

4/ The components of Cognitive Flexibility Theory including: ‘avoidance of oversimplification and overregularizations’, ‘multiple representations’, ‘multiple interconnectedness’ , and ‘schema assembly’, should be stressed in the examinations.

5/ The students should be encouraged to select alternatives using a set of valid criteria.

6/ The students’ background knowledge should be emphasised for the attainment of newness and knowledge production rather than knowledge reproduction.

7/ It is high time to assess students’ communicative competence to figure out their reasoning through spoken discourse.

8/ Assessing students’ problem solving skills through speaking would have a positive impact on the students’ improvement of their language and cognitive skills.

9/ The notion of positive and negative ‘washback’ should be stressed.

10/ Students should be prepared to actively and successfully handle real-life language issues

Implications of the Experimentation's Findings

The obtained findings of the experiment have implications for the teaching and assessment of problem solving in EFL classes. The following are suggested:

- 1/** Frequent teaching of problem solving methods such as Polya's model might have positive impact on EFL students' problem solving capacities.
- 2/** The teaching of problem solving methods should be aligned with the students' background knowledge as both play a crucial role in the enhancement of students' achievements.
- 3/** Students' understanding of the deep meaning of language issues is necessary for effective problem solving
- 4/** Students need to be exposed to strategic problem solving in the class, as well as through home work assignments.
- 5/** Effective problem solving can be encouraged through the implementation of problem based learning principles
- 6/** Support of EFL students to get rid of their weaknesses in terms of analysis and deep understanding should be at the heart of the teachers' concerns and practices.
- 7/** Students' higher-cognitive skills should be catered for through frequent, informative and constructive feedback.

References

Primary Sources

Commission National des Programmes (2006). *Programme d'Anglais de la 3^{ème} Année Secondaire*. Algiers: ONPS.

Commission National des Programmes (2007). *New prospects*. Algiers: ONPS.

Commission National des Programmes (2007). *Teachers' book*. Algiers: ONPS.

Secondary Sources

Affandy, H., Sunarno, W., & Hajarna, S., R. (2024). Integrating creative pedagogy into problem-based learning: The effects on higher order thinking skills in science education. *Thinking Skills and Creativity*, Volume 53. Retrieved from <https://doi.org/10.1016/j.tsc.2024.101575>

Alderson, J.C., Clapham, C. & Wall, D. (1995). *Language test construction and evaluation*. Cambridge: Cambridge University Press.

Alderson, J. C., & Hamp-Lyons, L. (1996). TOEFL preparation courses: A study of Washback. *Language Testing*, 13(3), 280-297.

Altowaim, M. A. (2015). Effectiveness of washback in language testing: Analyzing the validity and reliability. *Modern Journal of Language Teaching Methods*, 5(2), 33-38.

Amini, M., & Ibrahim-Gonzalez, N. (2012). The washback effect of cloze and multiple-choice tests on vocabulary acquisition. *Language in India*, 12(7), 71-91.

Amabile, T.M. (1983). *The social psychology of creativity*. New York: Springer-Verlag.

An, S. & Zhang, S. (2024). Effects of ability grouping on students' collaborative problem solving patterns: Evidence from lag sequence analysis and epistemic network analysis. *Thinking Skills and Creativity* . 51 (1).101453 Retrieved from <https://doi.org/10.1016/j.tsc.2023.101453>

Andraide, H. L. & Cizek, G. J. (Eds.) (2010). *Handbook of formative assessment*. London:

Routledge.

- Andre, T. (1986). Problem solving and education. In G.D. Phye, & T. Andre (Eds.), *Cognitive classroom learning: Understanding, thinking, and problem solving* (pp. 169–204). Orlando: Academic Press
- Andrews, S. (1994). Washback or washout? The relationship between examination reform and curriculum innovation. In D. Nunan, R. Berry & V. Berry. (Eds.), *Bringing about change in language education: Proceedings of the International Language in Education Conference* (pp. 67-81). Hong Kong: University of Hong Kong.
- Andrews, S. (1994). The washback effect of examinations: Its impact upon curriculum innovation in English language teaching. *Curriculum Forum*, 4(1), 44-58.
- Ansarian, L., & Mei Lin, T. (2018). *Problem-based language learning and teaching: An innovative approach to learn a new language*. Gateway East: Springer Briefs in Education.
- Ashman, A., & Conway, R. (1997). *An introduction to cognitive education: Theory and applications* (1st ed.). London: Routledge.
- Azer, S.A. (2009) Problem-based learning in the fifth, sixth, and seventh grades: Assessment of students' perceptions. *Teaching and Teacher Education* 25 (8) , 1033-1042 Retrieved from <https://doi.org/10.1016/j.tate.2009.03.023>Get
- Bachman, L. F. (1990). *Fundamental considerations in language testing*. Oxford: Oxford University Press.
- Bachman, L. F., & Palmer, A.S. (1996). *Language testing in practice: Designing and developing useful language tests*. Oxford: Oxford University Press.
- Bagayoko, D., Kelley, E.L. & Hasan, S. (2000). Problem solving paradigm, *College Teaching*, 48 (1), 24-27. Retrieved from <https://doi.org/10.1080/87567550009596086>
- Bailey, K. M. (1996). Working for washback: A review of the washback concept in language

- testing. *Language Testing*, 13(3), 257-279.
- Bailey, K. M. (1999). Washback in language testing. *TOEFL Monograph Series, Ms. 15*. Educational Testing Service.
- Baker, L. (2009). Metacognition (604-607). In E. Anderman, E. & L. Anderman (Eds.), *Psychology of classroom learning*. New York: Macmillan Reference USA.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W H Freeman/Times Books/Henry Holt & Co.
- Bartee, E.M. (1973). A holistic view of problem solving. *Management Science*. 20 (4), 439-448. Retrieved from <http://www.jstor.org/stable/2629624>
- Berry, R. (2008). *Assessment for learning*. Hong Kong: Hong Kong University Press.
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., & Miller-Ricci, M. (2012). Defining twenty-first century skills. In P. Griffin, B. McGraw, & E. Care (Eds.), *Assessment and teaching of 21st century skills* (pp. 17–66). Dordrecht: Springer
- Birmingham, P & Wilkinson, D. (2003). *Using research instruments*. London: Routledge.
- Bloom, B. S. (1947). Implications of problem-solving difficulties for instruction and remediation. *The School Review*, 55 (1), 45-49. Retrieved from doi: 10.1086/441359
- Bloom, B.S. (Ed.) (1956). *Taxonomy of educational objectives: The classification of educational goals: Handbook 1: Cognitive domain*. New York: Longman.
- Boden, M. A. (1991). *The creative mind: Myths and mechanisms*. New York: Basic Books.
- Boud, D. (Ed.) (2015). *Developing student autonomy in learning* (2nd ed.). London: Taylor & Francis.
- Boudinare, S. (2020). *Using Problem-based learning instructions in stimulating business students' English speaking skills: A case of management students at commerce and management department-Setif1-University*
- Boukersoul, F. & Sadoune, F. (2024). Investigating the Twenty-First Century Skills

- Integration in the EFL Second Generation Textbooks. *Ichkalat journal*, 13, (1), 101-118
- Bransford, J. D. & Stein, B. S. (1993). *The ideal problem solver: A guide for improving thinking, learning, and creativity*. New York: W.H. Freeman and Company.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. Retrieved from <https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative research in sport, exercise and health*, 11(4), 589–597. Retrieved from <https://doi.org/10.1080/2159676x.2019.1628806>
- Brookhart, S. M. (2008). *How to give effective feedback to your students*.
Virginia: Alexandria.
- Brookhart, S. M. (2010). *How to assess higher-order thinking skills in your classroom*.
Alexandria: Association for Supervision and Curriculum Development.
- Brooks, J. & Brooks, M. (1999). *In search of understanding: The case for constructivist classrooms*. Alexandria: Association for Supervision and Curriculum Development
- Brown, J. S., Collins, A. & Duguid, P. (1989) Situated cognition and the culture of learning, *Educational Researcher*, 18(1), 32–42
- Brown, D. H. (2003). *Language assessment: Principles and classroom practices*. Oxford: Oxford University Press.
- Brown, J. D. (1995). *The elements of language curriculum: A systematic approach to program development*. Boston: Heinle & Heinle.
- Brown, J.D. (2011). Quantitative Research in Second Language Studies. In Hinkel, E. (Edr.) *Handbook of research in second language teaching and learning* (199-205). New York: Routledge.

- Bruner, J. (1996). *The culture of education*. Cambridge, MA: Harvard University Press.
- Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics*, 1(1), 1-47.
- Carter, M. (1988). Problem solving reconsidered: A pluralistic theory of problems. *College English*, 50 (5) , 551-565. Retrieved from <http://www.jstor.org/stable/377491>
- Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics*, 1(1), 1-47.
- Chaiyarat, K. (2024)Enhancing creative problem solving and learning motivation in social studies classrooms with gamified cooperative learning. *Thinking Skills and Creativity* 54(4).101616 Retrieved from<https://doi.org/10.1016/j.tsc.2024.101616>
- Chia T. & Hsu, F. (2024). Effect of education based on creative problem-solving and asynchronous online discussions on student creativity in a product design course. *Thinking Skills and Creativity*, 54 (4)101650 Retrieved from <https://doi.org/10.1016/j.tsc.2024.101650>
- Choi, E., Lindquist, R. & Song, Y. (2014). Effects of problem-based learning vs. traditional lecture on Korean nursing students' critical thinking, problem-solving, and self-directed learning. *Nurse Education Today*, 34, (1), 52-56.
- Cizek, G. J. (2010). “An Introduction to formative assessment: History, characteristics and challenges” in Andraide, Heidi L. & Cizek, Gregory J.(Eds.). *Handbook of formative assessment* (pp. 3-17). London: Routledge.
- Cunningsworth, A. (1984). *Evaluating and selecting EFL teaching materials*. London: Heinemann.
- Cunningsworth, A. (1995). *Choosing your coursebook*. London: Longman.
- Dalton, S. T. & Tharp, R. G. (2000).*Standards for pedagogy: Research,*

- Theory and Practice in G. Wells and G. Claxton (Eds.) *Learning for life in the 21st century: Sociocultural perspectives on the future of Education* (pp. 181-194). Oxford: Blackwell Publishers Ltd.
- David W., D. & Birmingham, P. (2003). *Using research instruments: A guide for researchers*. London: Routledge.
- Davidson, J.E. (2003) Insights about insightful problem solving. In J.E. Davidson & R.J Sternberg (Eds.) (149-175) in *The psychology of problem solving* (149-175). Cambridge: Cambridge University Press.
- Day, C. (1999). *Developing teachers: The challenges of lifelong learning*: London: Falmer Press
- Debache, A. (2016) Enhancing problem solving and motivation through cooperative learning: The case of postgraduate students, Department of Geology, University of Mentouri Brothers, Constantine. Constantine: University of Mentouri Brothers
- De Corte, E. (1990). Towards powerful learning environments for the acquisition of problem-solving skills. *European Journal of Psychology of Education*, 5(1), 5–19. Retrieved from <http://www.jstor.org/stable/23422222>
- Delisle, R. (1997). *How to use problem-based learning in the classroom*. Alexandria: Association for Supervision and Curriculum Development.
- Denzin, N. K. (1978). *Sociological methods: A sourcebook* (2nd ed.). New York: McGraw-Hill.
- Dewey, J. (1925). *Experience and nature*. La Salle: Open Court.
- Dewey, J. (1938). *Experience and education*. New York: Macmillan Company.
- Diffily, D., & Sassman, C. (2003). *Project-Based learning with young children*. New York: Heinemann
- Donham, R.S., Schmiege, F.I., & Allan, D.E. (2001). The large and small of it: a case study of

- introductory biology courses. In B.J. Duch, Z.E. Groh, & D.E. Allen (Eds.). *The power of problem-based learning* (179-190). Virginia: Stylus Publishing, LLC
- Dörnyei, Z. (2003). *Questionnaires in second language research*. New Jersey: Lawrence Erlbaum Associates, Inc.
- Dörnyei, Z. (2007). *Research methods in applied linguistics*. New York: Oxford University Press.
- Drumheller, S. J. (1974). Behavioral objectives as learning inhibitors: A dilemma and a solution. *Educational Technology*, 14(10), 17-20.
- Duch, B. J., Groh, S. E. & Allen, D. E. (2001). Why problem-based learning? A case study of institutional change in undergraduate education. In B.J. Duch, Z.E. Groh, & D.E. Allen (Eds.). *The power of problem-based learning* (3-12). Virginia: Stylus Publishing, LLC
- Duncker, K. (1945) *On problem-solving*, vol. 58. American Psychological Association INC, Washington
- Elder, L., & Paul, R. (2012). *The thinker's guide to analytic thinking*. Tomales, CA: Foundation for Critical Thinking.
- Ericson, K.A. (2003). The Search for General Abilities and Basic Capacities. Theoretical Implications from The Modifiability and Complexity of Mechanisms Mediating Expert Performance. In R.J. Sternberg and E. L. Grigorenko (Eds.). *The Psychology of abilities, competences, and expertise* (pp.93-125). New York: Cambridge University Press.
- Eysenck, M. W. & Keane, M. T. (1993). *Principles of Cognitive Psychology*. Trowbridge: Redwood Books.
- Eysenck, M. W. & Keane, M. (2005) *Cognitive psychology: A Student's handbook*. New York: Psychology Press.

- Fitzpatrick, J. L. J.R. Blaine R. & Worthen, B.R. (2011). *Program evaluation: Alternative approaches and practical guidelines* (4th ed.).New Jersey: Person Education.
- Frazier, J. & Juza, P. (2008). Materials used in the USA in B. Tomlinson (Ed.). *English language learning materials: A critical review* (pp. 179-192) London: Continuum International Publishing Group.
- Frederiksen, N. (1984). Implications of cognitive theory for instruction in problem solving. *Review of Educational Research*. 54 (3), 363-407. Retrieved from <http://www.jstor.org/stable/1170453>
- Fulcher, G. (2010). *Practical language testing*. London: Hodder Education, An Hachette UK Company.
- Gao, Q., Zhang, S., Cai, Z., Liu, K., Hui, N., Tong, M. (2022) Understanding student teachers' collaborative problem solving competency: Insights from process data and multidimensional item response theory. *Thinking Skills and Creativity*, 45 (4).101097 Retrieved from <https://doi.org/10.1016/j.tsc.2022.101097>
- Gardner, H. (1993). *Creating minds*. New York: Basic Books.
- Gipps, C. V. (2002). *Beyond testing: Towards a theory of educational assessment*. London :Routledge .
- Goldman, A. (1983). Epistemology and the theory of problem solving. *Synthese*, 55 (1), 21-48. Retrieved from <http://www.jstor.org/stable/20115856>
- Greeno, J. G. (1976). Cognitive objectives of instruction: Theory of knowledge for solving problems and answering questions. In D. Klahr (Ed.), *Cognition and Instruction* (pp. 123-159). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Greiff, S., Wüstenberg, S., Csapo, B., Demetriou, A., Hautamäk, J. Graesser, A. C., & Martin, R. (2014). Domain-general problem solving skills and education in the 21st century. *Educational Research Review*, Volume, 13. 74-83. Retrieved from <https://doi.org/10.1016/j.edurev.2014.10.002>

- Gronlund, N. E. (2004). *Writing instructional objectives for teaching and assessment*. New York: Prentice Hall.
- Gronlund, N. & Brookhart, S (2008). *Gronlund's writing instructional objectives*. Upper Saddle River, N.J: Pearson.
- Goodman, D. (2008). Problem-based learning in the MPA Curriculum. *Journal of Public Affairs Education*, 14 (2), 253-270. Retrieved from <http://www.jstor.org/stable/40215813>
- Gross, R.E., & McDonald, F.J. (1958). The problem-solving approach. *The Phi Delta Kappan* 39 (6), 259-265.
- Grunert O'Brien, J., Millis, B., & Cohen, M. (2008). *The course syllabus: A learning-centered approach* (2nd ed.) San Francisco: Jossey-Bass.
- Hamm, M. & Adam? D. (2009). *Activating assessment for all students: Innovative activities, lesson plans, and informative assessment*. Maryland: Rowman & Littlefield Education
- Hammersley, M. (2011). *Methodology: Who needs it ?* London : Sage Publications Ltd
- Heine, L. (2010). *Problem solving in a foreign language*. Berlin: Göttingen.
- Henen, C. (2023). The Use of integrated performance assessment in enhancing English foreign language learners' communicative competence. The case of first year of English at M'sila University Mohamed Kheider University – Biskra.
- Henton, J., Marotz-Baden, R. & Kieren, D. (1979). Problem solving in the classroom. *The Family Coordinator*, 28 (1), 61-66. Retrieved from <http://www.jstor.org/stable/583269>
- Herman, J.L. Aschbacher, P.R. Winters, L. (1992). *A practical guide to alternative assessment*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Hooijdonk, M. V., Mainhard, T., Kroesbergen, E.H., & Tartwijk, J. V. (2023). Creative

- problem solving in primary school students. *Learning and Instruction*, Volume 88. Retrieved from <https://doi.org/10.1016/j.learninstruc.2023.101823>
- Hsieh, H. & Shannon, S. (2005). Three approaches to qualitative content analysis. *Qualitative health research* 15(9), 1277-1288. Retrieved from DOI: 10.1177/1049732305276687
- Hughes, A. (1996) *Testing for language teachers*. Cambridge: Cambridge University Press.
- Hutchinson, T. & Waters, A. (1987). *English for specific purposes*. Cambridge: Cambridge University Press.
- Hutchinson, T., & Torres, E. (1994). The textbook as agent of change. *ELT Journal*, 48, 315-328. Retrieved from <https://doi.org/10.1093/elt/48.4.315>
- Hymes, D. H. (1972). On communicative competence. In J. B. Pride, & J. Holmes (Eds.), *Sociolinguistics: Selected readings* (pp. 269-293). Harmondsworth: Penguin.
- Hung, W. (2006). The 3C3R model: A Conceptual framework for Designing Problems in PBL. *Interdisciplinary Journal of Problem-Based Learning*, 1(1). Retrieved from <http://dx.doi.org/10.7771/1541-5015.1006>
- Hymes, D. H. (1972). On communicative competence. In J. B. Pride, & J. Holmes (Eds.), *Sociolinguistics: Selected readings*(pp. 269-293). Harmondsworth: Penguin.
- Isaksen, S. G. et al (2011). *Creative approaches to problem solving: A framework for innovation and change*. California: SAGE Publications, Inc.
- Islam, C. & Mares, C. (2014). Adapting classroom materials. In B. Tomlinson (Ed.). *Developing materials for language teachers*. New York: Bloomsbury Academic.
- Jacobson, M. J. & Spiro, R. J. (1993) *Hypertext Learning Environments, Cognitive Flexibility, and the Transfer of Complex Knowledge: An Empirical Investigation*. Tech Report No. 573. Champaign, Ill.: University of Illinois, Center for the Study of Reading.

- Johnson, R. B., Onwuegbuzie, A.J. & Tuner, L.A. (2007). Toward a definition of mixed method research. *Journal of Mixed Methods Research*.112 (1). Doi 10.1177/1558689806298224
- Jonassen, D. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development*,48(4). 63-85 Retrieved from <http://www.jstor.org/stable/30220285>
- Jonassen, D. (2004). *Learning to solve problems: An instructional design guide*. San Francisco: John Wiley & Sons, Inc.
- Jonassen, D.H. (2011). *Learning to solve problems: A handbook for designing problem-learning environments*. New York: Routledge.
- Klaczynski, P. A., Gordon, D. H., & Fauth, J. (1997). Goal-oriented critical reasoning and individual differences in critical reasoning biases. *Journal of Educational Psychology*, 89, 470–485.
- Kök, F.Z. & Duman, B. (2023). The effect of problem-based learning on problem solving skills in English language teaching. *Journal of Pedagogical Research*, 7, (1). Retrieved from <https://doi.org/10.33902/JPR.202318642>
- Kul, I. An analysis of the 11th grade Turkish EFL textbook in terms of 21st century skills. (2024). *International Journal of Social Sciences Paradigms*, 2(2), 20241. Retrieved from <https://doi.org/10.5281/zenodo.13133784>
- Kumar, R. (2011). *Methodology: A step by step for beginners*. (3ed) London: Sage Publications ltd.
- Laudan, L. (1996). *Beyond positivism and relativism: theory, method, and evidence*. Colorado: Westview Press Boulder, CO.
- Leavy, P. (2014). “Qualitative research” in P. Leavy et al. (eds). *The oxford handbook of*

- Qualitative research (1-62) . Oxford: Oxford Library of Psychology .
- Lewis, A. & Smith, D. (1993). Defining higher order thinking. *Theory into Practice*, 32 (3), 131-137.
- Linfield, K. J. & Posavac, E.J. (2009). *Program evaluation*. London: Routledge.
- Lohman, M & Finkelstein, M. (2000). Designing groups in problem-based learning to promote problem-solving skill and self-directedness. *Instructional Science*, 28 (4), 291-307. Retrieved from <http://www.jstor.org/stable/23371450> .
- Lonergan, R. Cumming, T.R., & O'Neill, S.C. (2022). Exploring the efficacy of problem-based learning in diverse secondary school classrooms: Characteristics and goals of problem-based learning. *International Journal of Educational Research* 112 (3) 101945 Retrieved from <https://doi.org/10.1016/j.ijer.2022.101945>
- Lovett, M. C., (2002). Problem solving. In D. Medin (Ed.), *Stevens' handbook of experimental psychology: Vol. 2, Memory and cognitive processes* (3rd ed., pp. 317-362). New York: Wiley
- Lubart, T.I. & Mouchiroud, C. (2003). Creativity: A source of difficulty in problem solving. in J.E. Davidson & R.J Sternberg (Eds.) *The psychology of problem solving* (127-148). Cambridge: Cambridge University Press.
- Macalister, J & Nation, P. (2010). *Language curriculum design*. New York: Routledge.
- Mackey, A. & Gass, M.S. (2005). *Second language research: Methodology and design*. New Jersey: Lawrence Erlbaum Associates, Inc.
- Madsen, H.S. (1983). *Techniques in testing*. Oxford: Oxford university press.
- Mahn, H., & John-Steiner, V. (2002). The gift of confidence: A Vygotskian view of emotions. In Wells, G & Claxton, G. (Eds.). *Learning for life in the 21st century: Sociocultural perspectives on the future of education* (pp. 46-58). Oxford: Blackwell Publishers Ltd

- Mares, C. (2003). 'Writing a coursebook'. In B. Tomlinson (Ed.), *Developing materials for language teaching* (pp. 130–140). London: Continuum.
- Markham, T., Larmer, J., & Ravitz, J. (2003). *Project-based learning handbook: A guide to standards focused project-based learning for middle and high school teachers*.
Novato, CA: Buck Institute for Education.
- McLaughlin, B. (1990). Conscious" versus "unconscious" learning. *TESOL Quarterly*, 24 (4), 617-634. Retrieved from <http://www.jstor.org/stable/358711>.
- Marzano, R. J. (2001). *Designing a new taxonomy of educational objectives*. Thousand Oaks, CA: Corwin Press.
- Matlin, M. (2009). *Cognition* (7th ed.). Crawfordsville: John Wiley & Sons.
- Mayer, R. E., & Wittrock, M. C. (2009). Problem solving. In E.M. Anderman & L.H. Anderman, L.H. (Eds.), *Psychology for classroom learning: An encyclopedia* (pp.702-706). New York, USA: Macmillan.
- Mayring, P. (2000). Qualitative Content Analysis [28 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 1(2), Art. 20,
<http://nbnresolving.de/urn:nbn:de:0114-fqs0002204>.
- McDonough, J. & Shaw, C. (1993). *Materials and methods in ELT*. Oxford: Blackwell.
- McDonough, J., Shaw, C. & Masuhara, H. (2013). *Materials and method in ELT: A teacher's guide* (3ed).John Wiley and Sons, Inc.
- McGrath, I. 2016. *Materials evaluation and design for language teaching*. Edinburgh: Edinburgh University Press.
- Medeiros, K. E., Watts, L. L. & Mumford, M. D. (2017). Thinking inside the box: Educating leaders to manage constraints in C. Zhou. (Ed.). *Creative problem solving skills in higher education*. (pp. 25-49) E. Chocolate Avenue: IGI Global.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded*

sourcebook (2nd ed.). Thousand Oaks, CA: Sage.

Mishan, F. (2004). *Designing authenticity into language learning materials*. Cambridge: Cambridge university press

Molnár, G., Arababah, S.A., & Greiff, S. (2022). How we explore, interpret, and solve complex problems: A cross-national study of problem-solving processes. *Heliyon*, 8, (1). Retrived from <https://doi.org/10.1016/j.heliyon.2022.e08775>

Moreno, R. (2010). *Educational psychology*. New York: John Wiley & Sons, Inc. Moseley, D.,

Baumfield, V., Elliott, J., Gregson, M., Higgins, S., Miller, J., Newton, D. P. (2005). *Frameworks for thinking :A handbook for teaching and learning*. Cambridge: Cambridge University Press.

Moseley, D., Baumfield, V., Elliott, J., Gregson, M., Higgins, S., Miller, J., & Newton, D. P. (2005). *Frameworks for thinking: a handbook for teaching and learning*. Cambridge: Cambridge University Press.

Naeem, M., Howell, K., Ozuem, W., & Ranfagni, S. (2023). A Step by step process of thematic analysis to develop a conceptual model in qualitative research. *International Journal of Qualitative Methods* 22 (11). 1-18 Retrieved from DOI: 10.1177/16094069231205789

Nation, I.S. & Macalister, J. (2010). *Language curriculum design*. New York: Routledge.

Newby, P. (2014). *Research Method for education* (2nd ed). London: Routledge.

Newmann, F. M. (1990). Higher-order thinking in teaching social studies: A rationale for the assessment of classroom thoughtfulness, *Journal of Curriculum Studies*, 22 (1), 41-56. Retrieved from DOI: 10.1080/0022027900220103

Novick, L. R., & Bassok, M. (2005). Problem solving. In K. J. Holyoak & R. G. Morrison (Eds.), *The Cambridge handbook of thinking and reasoning* (pp. 321–349). Cambridge: Cambridge University Press.

- Obiano, J. & Parangat, K. (2023). Assessing the Effect of Polya's Theory in Improving Problem-Solving Ability of Grade 11 Students in San Marcelino District. *American Journal of Humanities and Social Sciences Research*. 8 (7), 110-119.
- OECD (Edr). (2005). *Formative assessment: Improving learning in secondary classrooms*. Paris: OECD Publications.
- Ohlsson, S. (1996). Learning from performance errors. *Psychological Review*, 103, 241–262.
- Öllinger, M. & Goel V., (2010) "Problem Solving" in , Britt M et al. *Towards a Theory of Thinking: building blocks for a conceptual Framework* .London : Springer Heidelberg Dordrecht.
- O'Malley, J.M., & Valdez Pierce, L. (1996). *Authentic assessment for English language learners: Practical approaches for teachers*. New York: Addison-Wesley.
- Oon-Seng T. (2003) *Problem-Based learning innovation: Using problems to power learning in the 21st Century*: Singapore: Seng Lee Press
- Osterlind Steven J. 'Classroom assessment' (2009) (155-158) in E. M. Anderman , & L.H. Anderman (Eds.) *Psychology of classroom learning: An encyclopedia*. New York: Macmillan.
- Palumbo, D.B. (1990). Programming language/problem-solving research: A review of relevant issues. *Review of Educational Research* 60 (1), 65-89.
- Paul, R., & Elder, L. (2004). *The miniature guide to critical thinking concepts and tools*. Dillon Beach, Calif.: Foundation for Critical Thinking.
- Pellegrino, J. W, Chudowsky, N. & Glaser , R., (Eds.) (2001). *Knowing what students know: The science and design of educational assessment*. Washington: National Academy Press.
- Phumeechanya & Wannapiroon (2014). Design of problem-based with scaffolding learning activities in ubiquitous learning environment to develop problem-solving skills.

- Procedia - Social and Behavioral Sciences 116 (1)*, 4803-4808. Retrieved from <https://doi.org/10.1016/j.sbspro.2014.01.1028>
- Phye, Gary D. (Ed.) (1997). *Handbook of classroom assessment: Learning, adjustment, and achievement*. California: Academic Press, Inc.
- Phye, G. D. (1997) Classroom assessment: A multidimensional perspective. In G.D. Phye (Ed.) *Handbook of classroom assessment: Learning, achievement and adjustment*. California: Academic Press, Inc. 33-51.
- Phy, Gary D. 1997. "Classroom assessment: A multidimensional perspective" in G. D. Phye (Edr). *Handbook of classroom assessment: Learning, adjustment, and achievement* (pp.. California: Academic Press, 1997.
- Piaget, J. (1959). *The language and thought of the child* (3rd ed.) (M. Gagain, Trans.). New York: Humanities Press.
- Piaget, J., & Inhelder, B. (1969). *The psychology of the child*. New York: Basic Books.
- Piaget, J. (1970). *Genetic epistemology*. New York: W.W. Norton and Company. INC.
- Pickford, R. & Brown, S. (2006). *Assessing skills and practice*. London: Routledge: Taylor and Francis Group
- Polya, G. (1962). *Mathematical discovery on understanding, learning, and teaching problem solving*. New York: Wiley.
- Polya, G. (1956). *How to solve it: A new aspect of mathematical method*. Princeton: Princeton University Press.
- Popham, J. W. (2003). *Teach better, test better: The instructional role of assessment*. Alexandria: Association for Supervision and Curriculum Development.
- Popham, J. W. (2008) *Transformative assessment*. Alexandria: Association for Supervision and Curriculum Development.
- Popper, K. (1979). *Objective knowledge: An evolutionary approach*. London: Clarendon

Press.

- Prabhu, N. S. (1987). *Second language pedagogy*. Oxford: Oxford University Press.
- Pretz, J. E., Naples, A. J., & Sternberg, R. J. (2003). Recognizing, defining, and representing problems. In J. E. Davidson & R. J. Sternberg (Eds.), *The psychology of problem solving* (pp. 3–30). Cambridge University Press.
- Proctor, T. (2006). *Creative problem solving for managers* (2nded.). London: :Routledge.
- Pickford, R. & Brown, S. (2006). *Assessing skills and practice*. London: Routledge:
Taylor and Francis Group
- Pritchard, A. & Woollard, J. (2010). *Constructivism and social learning*. London:
Routledge.
- Quellmalz, E.S. (1987). Developing reasoning skills. In J.B. Baron & R. Sternberg (Eds.),
Teaching thinking skills: Theory and practice (pp. 86-105). New York: W.H. Freeman
and Co.
- Quellmalz, E.S. (1987). Developing reasoning skills. In J.B. Baron & R. Sternberg
(Eds.),*Teaching thinking skills: Theory and practice* (86-105). New York: W.H.
Freeman and Co.
- Quellmalz, E. & Hoskyn, J. (1997). Classroom assessment of reasoning strategies. In G.D.
Phye (Ed.). *Handbook of classroom assessment: Learning, adjustment and
achievement* (103-130). London: : Academic Press.
- Pritchard, A. (2009). *Ways of learning: Learning theories and learning styles in the
classroom*. London: Routledge.
- Reed, S. K. (2007). *Cognition: Theory and applications* (7th ed.). Belmont, USA: Thomson
Wadsworth.
- Renninger, K. A. (2010). Working with and cultivating the development of interest, self-
efficacy, and self-Regulation in D.D. Preiss, & R. J. Sternberg (Eds) *Innovations*.

- in educational psychology: Perspectives on learning, teaching, and human development* (158-195). New York: Springer Publishing Company.
- Resnick, L. B., Michaels, S., & O'Connor, M. C. (2010). How (well-structured) talk builds the mind. In D. D. Preiss & R. J. Sternberg (Eds.), *Innovations in educational psychology: Perspectives on learning, teaching, and human development* (pp. 163–194). Springer Publishing Company.
- Richards, J., & Rodgers, T. (2001). *Approaches and methods in language teaching*. New York: Cambridge University Press.
- Richards, J. C. & Schmidt, R. (2010). *Longman dictionary of language teaching and applied linguistics*. London: Pearson Education Limited.
- Richards, J. C., & Farrell, T. S. (2005). *Professional development for language teachers: Strategies for teacher learning*. Cambridge: Cambridge University Press.
- Richards, K. (2011). 'Case Study' in E. Hinkel, Eli et al., (Eds.). *Handbook of research in second language teaching and learning* (207-221): Volume II. New York: Routledge.
- Rinesko, A. B (2021). The representation of 21st century skills in an Indonesian EFL textbook. *LLT Journal*, 24, (1), 191-211. Retrieved from <http://ejournal.usd.ac.id/index.php/LLT>
- Robertson, S. Ian. (2001). *Problem solving*. USA: Taylor and Francis Inc.
- Rossi, P.H., Lipsey, M.W. & Freeman, H.E. (2004) *Evaluation: A systematic approach*. Thousand Oaks, CA: Sage. Seventh Edition
- Rozencajg,, P. (2003). Metacognitive factors in scientific problem solving .*European Journal Of Psychology of Education*.(18), 281-294.
- Santrock, J.W. (2001). Educational psychology*. New York: McGraw- Hill Companies, Inc.

- Sato, M. & Rogers, C. Case (2010). Methods in teacher education in, P. Penelope; E. Baker & B. McGaw (Eds), *International encyclopedia of education* (3rd ed.) (pp. 592-597). Oxford: Academic Press
- Savignon, S. J. (1997). *Communicative competence: Theory and classroom practice* (2nd ed.). New York: McGraw-Hill
- Schunk, D. H. (2012). *Learning theories: An educational perspective*. USA: Pearson Education.
- Sheldon, L. E. (1987). *ELT textbooks and materials: Problems in evaluation and development*. London: Modern English Publications/The British Council.
- Shaftel, F. R., & Shaftel, G. (1967). *Role-playing for social values: decision making in the social sciences*. Englewood Cliffs, N.J.: Prentice-Hall.
- Schreier, M. (2012). *Qualitative content analysis in practice*. London: SAGE Publications Ltd.
- Schreier, M. (2014). "Qualitative Content Analysis" in U. Flick (Ed.) *The Sage handbook of qualitative data analysis* (pp.170-183). London: SAGE Publications Ltd.
- Shuell, T.J. (1990). Teaching and learning as problem solving. *Theory into Practice* 29 (2), 102-108.
- Skinner, B. F. (1969). *Contingencies of reinforcement: A theoretical analysis*. New York: Appleton-Century-Crofts.
- Spiro, R., Coulson, R. L., & Feltovich, P. J. (1988) Cognitive flexibility theory: Advanced Knowledge acquisition in ill- structured domains,
<https://www.researchgate.net/publication/272177675> DOI:
 10.1017/CBO9780511529863.023

- Spiro, R.J., Feltovich, P.J., Jacobson, M. & Coulson, R.L. (1991) Cognitive flexibility, constructivism, and hypertext: Advanced knowledge acquisition in ill-Structured domains, *Educational Technology* 31(5); 24-33
- Spiro, R. J., & Jehng, J. C. (1990). Cognitive flexibility and hypertext: Theory and technology for the non-linear and multi-dimensional traversal of complex subject matter. In D. Nix & R. J. Spiro (Eds.), *Cognition, education, and multimedia: Explorations in high technology* (pp. 163–205). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Sternberg, R. J. (1985). *Beyond IQ: A triarchic theory of human intelligence*. Cambridge University Press
- Sternberg, R. J., Sternberg, K. & Mio, J. (1999). *Cognitive psychology*. Belmont: Wadsworth.
- Sternberg, R. J. (2009). *Cognitive psychology* (5th ed.). Belmont, CA: Wadsworth.
- Stillings, N. A., Weisler, S. E., Chase, C. H., Feinstein, M. H., Garfield, J. L., & Rissland, E. L. (1995). *Cognitive science: An introduction* (2nd ed.). Cambridge: The MIT Press.
- Stufflebeam, D. (1999). *Foundational models for 21st century program evaluation*. Western Michigan University : The evaluation center.
- Stufflebeam, Daniel L. & Coryn Chris L. S. (2014) *Evaluation theory, models, and applications*. San Francisco: Jossey-Bass.
- Suchman, E.A. (1967). *Evaluative research: Principles and practice in public service and social action program*. New York: Russell sage foundation.
- Tavakoli, H. (2012). *A dictionary of research mythology and statistics in applied linguistics*. Tehran: Rahnama Press
- Thomson, A. (2009). *Critical reasoning: A practical introduction*. (3rd Ed.). London: Routledge.
- Tobias, S., & Everson, H. T. (2009). Metacognition and children's writing. In D. J. Hacker, J.

- Dunlosky & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 107-126). New Jersey: Lawrence Erlbaum Associates, Inc.
- Todd, J.A., Jiang, Y., Steinberg, J. Pugh, S.L. & D’Mello, S. K. (2023). Investigating collaborative problem solving skills and outcomes across computer-based tasks. *Computer and Education*, Volume, 207. Retrieved from <https://doi.org/10.1016/j.compedu.2023.104928>
- Tomlinson, B. (2003). Evaluation and adaptation of materials in B. Tomlinson B. (Ed.). *Developing materials for language teaching*. (15-101). London: Cromwell Press.
- Tomlinson, B. (2011). Glossary of basic terms for materials development in language teaching in B. Tomlinson (Ed.) *Materials development in language teaching* (pp. ix-xviii). Cambridge: Cambridge University Press.
- Tomlinson, B. (2013). Developing principled frameworks for materials development. In B. Tomlinson (Ed.), *Developing materials for language teaching* (2nd ed) (pp. 95-118). London: Bloomsbury.
- Tomlinson, B. (Ed.). (1998). *Materials development in language teaching*. Cambridge: Cambridge University Press.
- Trilling, B. & Fadel, C. (2009) *21 St century skills: Learning for life in our times*. San Francisco: Jossey-Bass
- Ugyen, P. & Dema, Y. (2019). “Examining the Effects of Using Polya’s Problem- Solving Model on Mathematical Academic Achievement and Analyzing Ability of the Fourth Grade Students”. *Asian Journal of Education and Social Studies* 5 (2):1-8. <https://doi.org/10.9734/ajess/2019/v5i230142>.
- Ur, P. (1996). *A course in language teaching: Practice and theory*. Cambridge University Press, Cambridge.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*.

- Cambridge, MA: Harvard University Press.
- Vygotsky, L. S. (1987). Thinking and Speech. In R. W. Rieber, & A. S. Carton (Eds.), *The Collected Works of L. S. Vygotsky (Vol. 1), Problems of General Psychology* (pp. 39-285). New York: Plenum Press. (Original Work Published 1934)
- Wallas, G. (1926). *The art of thought*. New York: Harcourt, Brace & Company.
- Wells, G. & Claxton, G. (2002) Introduction: Sociocultural perspectives on the future of education in G. Wells & G. Claxton (Eds.). *Learning for life in the 21st century: Sociocultural Perspectives on the Future of Education (1-17)* Edited by Gordon Wells, G. & Claxton, G. (2002). *Learning for life in the 21st century: Sociocultural perspectives on the future of education*. Oxford: Blackwell Publishers Ltd.
- Whimbey, A. & Lochhead, J. (1999.) *Problem solving and comprehension (6ed)*. Massachusetts :Lawrence Erlbaum Associates, Inc.
- Whitten, S. & Graesser, A. C. (2003). Comprehension of text in problem solving. In J.E. Davidson & R.J Sternberg (Eds.) *The psychology of problem solving*(207-232). Cambridge: Cambridge University Press.
- Wiggins, G. P. (1993). *Assessing student performance: Exploring the purpose and limits of testing*. San Francisco: Jossey-Bass Inc.
- Williams, M. & Burden, R. (1997) *Psychology for language teachers: A social constructivist approach*. Cambridge University Press, Cambridge.
- Woo, P. & Falloon, G. (2022), Problem solved, but how? An exploratory study into students' problem solving processes in creative coding tasks. *Thinking Skills and Creativity* 46 (4). 101193 Retrieved from <https://doi.org/10.1016/j.tsc.2022.101193>
- Woollard, J. (2010). *Psychology for the classroom: Behaviourism*. New York: Routledge.
- Zimmerman, B. J. & Campillo, M. (2003). Motivating Self-Regulated Problem Solvers. In

J.E. Davidson & R.J Sternberg (Eds.) *The psychology of problem solving*(233-262).
Cambridge: Cambridge University Press.

APPENDICES

Appendix 1: *New Prospects*

Section 1: Language Assessment

- 1) Show what you can really do with the language items checklisted in the learning log below by using them in illustrative sentences of your own.
- 2) Tick next to each item in the learning log to indicate what you think is your level of performance. Then hand a copy of the learning log with your examples on a separate page to your teacher.

The Language items mentioned in learning log 1 I can...	The corresponding levels of the items in Bloom's taxonomy and Quellmalz' framework
A speak about beliefs and customs using used to .	Knowledge of grammar
B ask for and give information about a civilization using ago .	Knowledge of grammar
C speak about obligations in the past using had to .	Knowledge of grammar
D talk about the past achievements of ancient civilizations.	Synthesis
E use appropriate articles with concrete and abstract words.	Knowledge of grammar
F use though/ although/despite the fact that/in spite of the fact that to express concession.	Knowledge of grammar
G narrate a very short episode in the life of a legendary figure using the past simple, the past perfect and appropriate conjunctions of time.	Synthesis
H use adjectives and verbs with dependent prepositions.	Knowledge of grammar
I use the comparatives and the superlatives of quantifiers: much, little, many, few .	Knowledge of grammar
J make compound adjectives with well+ past participle.	Knowledge of grammar
K spell words correctly when I add to them such endings as -ed, -ing, -s and -er .	Knowledge of pronunciation
L pronounce the -ed ending correctly.	Knowledge of pronunciation
M pronounce the past forms of the auxiliary be .	Knowledge of pronunciation
N Pronounce words containing letters ch .	Knowledge of pronunciation

Unit One: Exploring the Past (Page: 43)

Unit Two: Ill-Gotten Gains Never Prosper (Page :72).

The Language items mentioned in learning log 2 I can...	The corresponding levels of the items in Bloom's taxonomy and Edys Quellmalz' framework
A use the present continuous passive in descriptions.	Knowledge of grammar
B give advice to someone using modals ought to/should, had better or their negatives.	Knowledge of grammar
C express obligation and prohibition using must or its negative form.	Knowledge of grammar
D express result using so+ adjective+ that and such+ adjective+ noun+ that.	Knowledge of grammar
E express cause and effect using because, for, as, since, as a result, consequently, etc.	Knowledge of grammar
F express hypothesis/condition using provided/providing that, as long as.	Knowledge of grammar
G ask for and give opinion.	Knowledge of language forms
H form opposites with prefixes dis-, il-, in- etc.	Knowledge of grammar
I form opposites with prefixes dis-, il-, in- etc.	Knowledge of word-formation
J form nouns adding suffix -ty to adjectives.	Knowledge of word-formation
K recognize and use stress shift in words having the same root. E.g. economy-economic-economical.	Knowledge of phonological rules
L pronounce words ending in -ics correctly.	Knowledge of pronunciation

Unit Three: Schools: Different and Alike (Page: 104).

The Language items mentioned in learning log 3 I can...	The corresponding levels of the items in Bloom's taxonomy and Edys Quellmalz' framework
A use the present simple passive voice to describe a process.	Synthesis
B use in order to and so that to express purpose.	Knowledge of grammar
C use the verb wish with appropriate tenses to express present, future and past wish.	Knowledge of grammar

D use unless and if with appropriate tenses to express warnings and condition.	Knowledge of grammar
E use appropriate link words to express cause and effect.	Knowledge of grammar
F use comparative adjectives (to compare things and people).	comparison
G give advice with should, ought to and If I were you.	Knowledge of grammar
H express obligation using must and have to.	Knowledge of grammar
I form adjectives from nouns by adding suffixes-al and -ive.	Knowledge of word-formation
J form nouns by adding -ing and -tion to verbs.	Knowledge of word-formation
K pronounce final s and mark the stress in words ending in -tion.	Knowledge of pronunciation
L pronounce words ending in -ics correctly.	Knowledge of pronunciation

Unit Four: Safety First (Page: 133).

The Language items mentioned in learning log 4	The corresponding levels of the items in Bloom's taxonomy and Edys Quellmalz' framework
I can...	
A use the gerund and the present simple.	Knowledge of grammar
B express cause and effect using because of, due to, owing to, as, since, etc.	Knowledge of grammar
C express cause and effect using as a result, consequently, as a consequence, as a result of, etc.	Knowledge of grammar
D express possibility using modals may/may not or its equivalent expressions likely that/possible that.	Knowledge of grammar
E use might/could/might not to speak about remote possibility.	Knowledge of grammar
F use though/although to express concession.	Knowledge of grammar
G express hypothesis using if-conditional type 1.	Knowledge of grammar
H express quantity using too much/too many/too little/too few and enough.	Knowledge of grammar
I use verbs with dependent preposition. E.g. complain to- about-.	Knowledge of grammar
J form adjectives by adding suffix-y to nouns.	Knowledge of word-formation
K mark sentence stress.	Knowledge of phonology
L pronounce the reduced forms of could have and might have.	Knowledge of phonology

Unit Five: Are We Alone? (Page:163).

The Language items mentioned in learning log 5	The corresponding levels of the items in Bloom's taxonomy and Edys Quellmalz' framework
I can...	
A ask someone how something is used.	Knowledge of language forms
B tell someone about the function of an object using used for or used to.	Knowledge of grammar
C ask someone for information about the dimensions, size, weight of objects using how and adjectives related to measurements.	Knowledge of grammar
D ask someone for information about distance, speed, and the time for a journey using how.	Knowledge of grammar
E compare objects using the comparatives of long/short adjectives and adverbs.	Comparison
F compare and contrast things using link words: like, unlike, while, whereas, and in contrast to.	Comparison
G make hypotheses and suppositions about imaginary situations using if-conditional type 2 and suppose.	Knowledge language forms
H use verbs (belong, believe, think...) with the present simple tense.	Knowledge of grammar
I agree/disagree with what someone has just said, using stative verbs with so and not.	Knowledge of grammar
J recognize the stress pattern of two-syllable verbs and pronounce them.	Knowledge of phonology
K recognize stress shift in words like increase (v) and increase(n).	Knowledge of phonology

Unit Six: Keep Cool! (Page: 194).

The Language items mentioned in learning log 6	The corresponding levels of the items in Bloom's taxonomy and Quellmalz' framework
I can...	
A seek advice from someone using should/ and ought to.	Knowledge of grammar
B give advice to someone using should and ought to.	Knowledge of grammar
C remind someone of his/ her obligations using must.	Knowledge of grammar
D ask someone about what s /he likes and hates doing.	Knowledge of grammar

E compare objects using the comparatives of long/short adjectives and adverbs.	Knowledge of grammar
F compare and contrast things using link words: like, unlike, while, whereas, and in contrast to.	Knowledge of grammar
G describe what love and friendship mean to me using appropriate articles.	synthesis
H use each other and one another in connected speech.	Knowledge of grammar
I express quantity using quantifiers: many, a lot of, much, few, little, etc.	Knowledge of grammar
J use prefix self- to form new adjectives and nouns.	Knowledge of Word-formation
K use suffixes -ic, -ous, etc. With nouns to form adjectives.	Knowledge of Word-formation
L use suffix -ty/-ity to form nouns.	Knowledge of Word-formation
M use suffix -en with adjectives to form adverbs.	Knowledge of Word-formation
N pronounce final -ed.	Knowledge of pronunciation
O pronounce the weak form of of in phrases such as made of , proud of , etc.	Knowledge of pronunciation
P pronounce the cluster nght in words such as strengthen.	Knowledge pronunciation

Section 2: Skills and strategies assessment

Take the test that your teacher will assign to you on one of the texts in the **Resource Portfolio** at the end of this book so as to check your progress in terms of skills and strategies. (Teacher' book pp: 39-42)

I. Read the text carefully and answer with True or False. Correct the false statements. (2.5 points)

- The Aghlabids ruled the Maghrib in eighth century.
- Mahdiyya was a rival caliphate to Baghdad in the ninth century.
- The Berber dynasty built the Great Mosque of Tlemcen.
- The Almohad encouraged the development of science.
- The rise of western civilizations followed the fall of the Maghribian ones.

II. What do the words below refer to in the text? (2pts)

- that** (of Baghdad), line 4
- ones**, line 7
- (among) others, line 18
- Its** (population), line 29

III. Circle the answer (a, b or c) which best corresponds to each of the following statements (2pts)

- "A rival caliphate" means:
 - a rich caliphate
 - an old caliphate
 - a competing caliphate
- "Andalusian art is refined" means:
 - it is delicate
 - it is declining
 - it is remarkable
- "A galaxy of great minds" means:
 - a large number of clever people
 - a gathering of scientists
 - an amalgam of ideas
- "The heirs of the Almohads" means:
 - the ancestors of the Almohads
 - the leaders of the Almohads
 - the followers of the Almohads

IV. Use of English

A/ Transform the following sentences, using a verb in place of the underlined noun (2pts)

- The Almohads were the protectors of a galaxy of great minds.
- The followers of Almohads were affected by loss of vitality.
- It was Ibn Khaldun who reported population decline.
- Epidemics were a consequence of this tragic shift of population.

B/ Fill in the table below with the corresponding form (1.5 pts)

NOUN	VERB	ADJECTIVE	ADVERB
a) ?			Chiefly
b) ?		?	greatly
c) culmination	?		
d) ?	Combining		
e) delicacy		?	
f) ?	observed		

C/ Using information from the text, complete the blanks in the sentences with expressions containing "used to" (2pts)

- The Euroafrican empire.....from Tripoli to Seville.
- Arab scholars..... to practical sciences.
- Kayrawan.....hundreds of thousands inhabitants in the ninth century.
- Nomads.....live all over the Maghrib before thirteenth century.

D/ Find synonyms for the following words (2pts)

- the highest point (§1)
- plain (§2)
- mainly (§2)
- followed (§3)

IV. Write a twenty-line essay on either of the following topics (6pts)

- A) Read again the last paragraph of the text and comment upon the following excerpt: “Ibn Khaldun (...) saw population decline as one of the factors in the decline of a civilization”.
- B) Write a letter to the World Heritage Committee of the United Nations requesting it to include one of the historical sites in your country in its official list. Emphasise the historical importance of the site.
- C) Write an opinion letter about the effects of globalism on the local cultures/civilizations in the world.
- D) Write a story involving some famous character (man, woman, child) in your local folk culture or in world culture.

Appendix 2

QUESTIONNAIRE

The present questionnaire was set to get insights into the EFL teachers’ views towards the implementation of problem solving activities in SE3 (Secondary Education – Year Three) classes in Algeria. You are kindly requested to answer the questions and provide full statements when needed. Your contribution will be highly valuable for the research work. All your answers will be kept anonymous. **Thank you very much for your contribution.**

Section One: General Information about the Respondents

(Type X next to the selected alternative.)

1/ Teaching Experience

Q1: Would you mention your experience in English teaching?

- Less than 5 years ● From 5 to 10 years ● More than 10 years
-

2/ Professional Training

Q2: Have you ever been at training in teaching English as a foreign language?

If yes, would you mention the training type?

- Yes No

.....
.....

3/ Teachers’ Academic Degree

Q3: Would you specify your academic degree?

- 1/Licence 2/Master 3 /Magister 4/Doctorate

Section Two: Teachers’ Views about the Implementation of Problem Solving in the Classroom

Q1: How do you perceive the implementation of problem solving in the classroom in terms of difficulty?

- (1) Very difficult (2) Difficult (3) Slightly difficult
(4) Slightly easy (5) Easy (6) Very easy

Q2: How far do you agree with this: “There is no effective instruction without effective problem solving tasks.”

- (1) Strongly agree (2) Agree (3) Partly agree
(4) Slightly disagree (5) Disagree (6) Strongly disagree

Q3: How far do you agree with this: “All EFL teachers are required to stress the assessment of students’ abilities to solve new problems.”

- (1) Strongly agree (2) Agree (3) Partly agree
(4) Slightly disagree (5) Disagree (6) Strongly disagree

4/Q4: How important is guiding students to develop positive attitudes towards solving novel and complex problems?

- Not important -Somewhat important
- Important -Very important

5/ Q5: Would you mention the benefits of problem-solving tasks implementation in classrooms?

.....
.....
.....

Section Three: Teachers’ Views about the Teaching of Problem Solving Strategies and Procedures

1/Q1: According to you, which of the following strategies fit(s) best problem-solving? (You can select more than one strategy).

- To use a solution to a similar, earlier problem to help in solving a new one.
- To identify the “ends” you target and then figure out the “means” you will use to reach them.
- To use heuristics (a heuristic is a general rule that is usually correct).
- To use an algorithm (a method that will always produce a solution to the problem, although the process can sometimes be inefficient).

2/ 2/ How much do you care about the following procedures? (Put a cross (X) in the right box.)

Teacher's Procedures	A great deal	A lot	A moderate amount	A little	Not at all
Organizing the teaching/learning process around problem solving tasks.					
Developing problem solving strategies.					
Motivating students to solve problems actively and accurately.					
Teaching students how to divide problems into sub-problems.					
Involving students in solving problems collaboratively.					
Involving students in solving problems individually.					
Teaching students how to solve problems systematically.					
Designing tasks students are typically required to perform in real-life situations.					

3/ Would you specify the frequency you ask your students for the identification and understanding of problems before solving them?

Very often Often Regularly

Rarely Never

Section Four: Teachers' Implementation of Problem Solving in the Classroom

1/ 1/ How often you implement each of the following? (Put a cross (X) in the right box.)

Task Features I involve my students in:	Very often	Often	Regularly	Rarely	Never
<i>generating, analysing varied and new options.</i>					
<i>planning for effective implementation of new solutions.</i>					

<i>gathering data by asking questions Who? What? Where? When? Why? and How?</i>					
<i>formulating problem statements which allow them to generate various options.</i>					
<i>examining, reviewing, selecting, and implementing the best options.</i>					
<i>predicting, synthesizing, hypothesizing, and concluding.</i>					
<i>evaluating the credibility and significance of arguments, decisions and reports.</i>					
<i>applying language rules though they do not necessarily understand the rules.</i>					
<i>identifying the critical as opposed to noncritical aspects of knowledge.</i>					
<i>constructing an accurate symbolic representation (e.g., a diagram, a chart) of the newly acquired knowledge.</i>					
<i>Doing difficult tasks dealing with similarities and differences between things.</i>					
<i>comparing things and explaining how they are different or alike.</i>					
<i>classifying things into categories and justifying the classification.</i>					
<i>explaining why information is valid or not.</i>					
<i>identifying and explaining errors in conclusions drawn by people.</i>					
<i>constructing and explaining new generalizations of what they have learned.</i>					
<i>identifying new applications of the language rules they have learned.</i>					
<i>demonstrating effective communication skills- both verbal and written - in various ways.</i>					

Appendix 3: BAC EXAMS

Results of the Analysis of the EFL Baccalaureate Exam 2010

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (15.39%)	
		Total (13 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	Selected-response item	Retrieval, comprehension	0 0.00%	
		Q 2	True/false items	Retrieval, comprehension	0 0.00%	
		Q 3	Matching	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Questions about to the text	Retrieval, comprehension	0 0.00%	
		Q 6	Gap-filling	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching (Antonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Gap-filling(word-formation)	Retrieval, comprehension	0 0.00%	
		Q 3	Transformation of sentences	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Sentence reordering	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 7.69 %
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 7.69 %

Results of the Analysis of the EFL Baccalaureate Exam 2011

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (15.39 %)	
		Total (13 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	Multiple choice	Retrieval, comprehension	0 0.00%	
		Q 2	True/false items	Retrieval, comprehension	0 0.00%	
		Q 3	Matching	Retrieval, comprehension	0 0.00%	
		Q 4	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 5	Matching	Retrieval, comprehension	0 0.00%	
		Q 6	Give a title to the text	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching	Retrieval, comprehension	0 0.00%	
		Q 2	Fill-in-the blanks	Retrieval, comprehension	0 0.00%	
		Q 3	Transformation of sentences	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Fill-in-the blanks	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 7.69%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 7.69%

Results of the Analysis of the EFL Baccalaureate Exam 2012

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (14.28%)
		Total (14 Items)			
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	Multiple choice	Retrieval, comprehension	0 0.00%
		Q 2	True/false	Retrieval, comprehension	0 0.00%
		Q 3	Matching	Retrieval, comprehension	0 0.00%
		Q 4	Sentence ordering	Retrieval, comprehension	0 0.00%
		Q 5	Questions about the text	Retrieval, comprehension	0 0.00%
		Q 6	Matching	Retrieval, comprehension	0 0.00%
	Activity Two Text Exploration	Q 1	Matching	Retrieval, comprehension	0 0.00%
		Q 2	Fill-in-the blanks	Retrieval, comprehension	0 0.00%
		Q 3	Ask questions on underlined words	Retrieval, comprehension	0 0.00%
		Q 4	Sentence transformation	Retrieval, comprehension	0 0.00%
		Q 5	Underline silent letters in words	Retrieval, comprehension	0 0.00%
		Q 6	Sentence reordering	Retrieval, comprehension	0 0.00%
Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 7.14%
	Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 7.14%

Results of the Analysis of the EFL Baccalaureate Exam 2013

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (15.39%)	
		Total (13 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	Multiple choice	Retrieval, comprehension	0 0.00%	
		Q 2	True/false	Retrieval, comprehension	0 0.00%	
		Q 3	Matching	Retrieval, comprehension	0 0.00%	
		Q 4	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 5	Matching	Retrieval, comprehension	0 0.00%	
		Q 6	Give a title to the text	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching	Retrieval, comprehension	0 0.00%	
		Q 2	Fill-in-the blanks (matching)	Retrieval, comprehension	0 0.00%	
		Q 3	Combining sentences	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Sentence reordering	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 7.69%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 7.69%

Results of the Analysis of the EFL Baccalaureate Exam 2014

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (14.28%)
		Total (14 Items)			
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	True/false questions	Retrieval, comprehension	0 0.00%
		Q 2	Sentence-reordering	Retrieval, comprehension	0 0.00%
		Q 3	Questions about the text	Retrieval, comprehension	0 0.00%
		Q 4	Selected-response item	Retrieval, comprehension	0 0.00%
		Q 5	Matching	Retrieval, comprehension	0 0.00%
		Q 6	Give a title to the text	Retrieval, comprehension	0 0.00%
	Activity Two Text Exploration	Q 1	Matching (synonyms)	Retrieval, comprehension	0 0.00%
		Q 2	Word formation (antonyms)	Retrieval, comprehension	0 0.00%
		Q 3	Sentence transformation	Retrieval, comprehension	0 0.00%
		Q 4	Matching	Retrieval, comprehension	0 0.00%
		Q 5	Classification (matching)	Retrieval, comprehension	0 0.00%
		Q 6	Sentence reordering to make a coherent paragraph	Retrieval, comprehension	0 0.00%
Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 7.14%
	Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 7.14%

Results of the Analysis of the EFL Baccalaureate Exam 2015

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (14.28%)	
		Total (14 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	Multiple choice	Retrieval, comprehension	0 0.00%	
		Q 2	True/false questions	Retrieval, comprehension	0 0.00%	
		Q 3	Sentence ordering	Retrieval, comprehension	0 0.00%	
		Q 4	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 5	Matching	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching	Retrieval, comprehension	0 0.00%	
		Q 2	Matching	Retrieval, comprehension	0 0.00%	
		Q 3	Word-formation	Retrieval, comprehension	0 0.00%	
		Q 4	Questions about the underlined words	Retrieval, comprehension	0 0.00%	
		Q 5	sentence transformation	Retrieval, comprehension	0 0.00%	
		Q 6	Gap filling	Retrieval, comprehension	0 0.00%	
		Q 7	Matching	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 7.14%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 7.14%

Results of the Analysis of the EFL Baccaureate Exam 2016

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (16.66%)	
		Total (12 Items)				
Activity One	Reading comprehension Questions in Relation to the Text	Q 1	Multiple choice	Retrieval, comprehension	0 0.00%	
		Q 2	Gap filling	Retrieval, comprehension	0 0.00%	
		Q 3	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 4	Give a title to the text	Retrieval, comprehension	0 0.00%	
		Q 5	Matching	Retrieval, comprehension	0 0.00%	
Activity Two	Text Exploration	Q 1	Matching (synonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Matching (word-formation)	Retrieval, comprehension	0 0.00%	
		Q 3	Sentence transformation	Retrieval, comprehension	0 0.00%	
		Q 4	Classification (matching)	Retrieval, comprehension	0 0.00%	
		Q 5	Sentence reordering to make a coherent paragraph	Retrieval, comprehension	0 0.00%	
Activity Three	Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

Results of the Analysis of the EFL Baccalaureate Exam 2017

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (16.66%)	
		Total (12 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	True/false	Retrieval, comprehension	0 0.00%	
		Q 2	Matching	Retrieval, comprehension	0 0.00%	
		Q 3	Questions about to the text	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Give a title to the text	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching (Synonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Matching (Word-formation)	Retrieval, comprehension	0 0.00%	
		Q 3	Combinations of pairs of sentences with connectors	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Sentence reordering to make a coherent paragraph	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

Results of the Analysis of the EFL Baccalaureate Exam 2018

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving Creative-Problem Solving 2 (16.66%)	
		Total (12 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	True/false	Retrieval, comprehension	0 0.00%	
		Q 2	Ideas ordering according to the text	Retrieval, comprehension	0 0.00%	
		Q 3	Questions about to the text	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Give a title to the text	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching (Antonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Gap filling (word-formation)	Retrieval, comprehension	0 0.00%	
		Q 3	Combining sentences with connectors	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Fill-in-the blanks	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition Writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

Results of the Analysis of the EFL Baccalaureate Exam 2019

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving Creative-Problem Solving 2 (16.66%)	
		Total (12 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	True/false items	Retrieval, comprehension	0 0.00%	
		Q 2	Matching	Retrieval, comprehension	0 0.00%	
		Q 3	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Multiple-choice	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching (Synonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Gap filling (word-formation)	Retrieval, comprehension	0 0.00%	
		Q 3	Sentence transformation	Retrieval, comprehension	0 0.00%	
		Q 4	Matching (Circle or write the silent letter in each of the following words.)	Retrieval, comprehension	0 0.00%	
		Q 5	Sentence reordering to get a coherent paragraph	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition Writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
		Topic Two	Composition Writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

Results of the Analysis of the EFL Baccalaureate Exam 2020

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (16.66%)	
		Total (12 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	True/false	Retrieval, comprehension	0 0.00%	
		Q 2	Matching	Retrieval, comprehension	0 0.00%	
		Q 3	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Give a title to the text	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching (synonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Word Division (word- formation)	Retrieval, comprehension	0 0.00%	
		Q 3	Combinations of pairs of sentences with connectors	Retrieval, comprehension	0 0.00%	
		Q 4	Classification (matching)	Retrieval, comprehension	0 0.00%	
		Q 5	Gap filling	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

Results of the Analysis of the EFL Baccalaureate Exam 2021

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (16.66%)	
		Total (12 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	True/false	Retrieval, comprehension	0 0.00%	
		Q 2	Matching	Retrieval, comprehension	0 0.00%	
		Q 3	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Give general idea to the text	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching (Synonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Word Division (word-formation)	Retrieval, comprehension	0 0.00%	
		Q 3	Ask questions which the underlined words answer	Retrieval, comprehension	0 0.00%	
		Q 4	Classification (matching)	Retrieval, comprehension	0 0.00%	
		Q 5	Sentence reordering to make a coherent paragraph	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

Results of the Analysis of the EFL Baccalaureate Exam 2022

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (16.66%)
		Total (12 Items)			
Activity One Reading comprehension Questions in Relation to the Text	Q 1	True/false	Retrieval, comprehension	0	0 0.00%
	Q 2	Matching	Retrieval, comprehension	0	0 0.00%
	Q 3	Questions about the text	Retrieval, comprehension	0	0 0.00%
	Q 4	Matching	Retrieval, comprehension	0	0 0.00%
	Q 5	Multiple choice	Retrieval, comprehension	0	0 0.00%
Activity Two Text Exploration	Q 1	Matching (synonyms)	Retrieval, comprehension	0	0 0.00%
	Q 2	Word Division (word-formation)	Retrieval, comprehension	0	0 0.00%
	Q 3	Combining sentences with connectors	Retrieval, comprehension	0	0 0.00%
	Q 4	Classification (matching)	Retrieval, comprehension	0	0 0.00%
	Q 5	Gap Filling	Retrieval, comprehension	0	0 0.00%
Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
	Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

THE ACTIVITIES

Results of the Analysis of the EFL Baccalaureate Exam 2023

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (16.66%)	
		Total (12 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	True/false questions	Retrieval, comprehension	0 0.00%	
		Q 2	Matching	Retrieval, comprehension	0 0.00%	
		Q 3	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Selected response item	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching (Antonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Word-formation to get antonyms	Retrieval, comprehension	0 0.00%	
		Q 3	Combining sentences with connectors	Retrieval, comprehension	0 0.00%	
		Q 4	Classification (matching)	Retrieval, comprehension	0 0.00%	
		Q 5	Fill-in-the gaps	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

Results of the Analysis of the EFL Baccalaureate Exam 2024

		Test Items	Marzano's Levels	Complex Problem Solving (CPS)	Total Items Involving CPS 2 (16.66%)	
		Total (12 Items)				
THE ACTIVITIES	Activity One Reading comprehension Questions in Relation to the Text	Q 1	Multiple choice	Retrieval, comprehension	0 0.00%	
		Q 2	Ideas ordering according to the text	Retrieval, comprehension	0 0.00%	
		Q 3	Questions about the text	Retrieval, comprehension	0 0.00%	
		Q 4	Matching	Retrieval, comprehension	0 0.00%	
		Q 5	Give a general idea of the text	Retrieval, comprehension	0 0.00%	
	Activity Two Text Exploration	Q 1	Matching (Synonyms)	Retrieval, comprehension	0 0.00%	
		Q 2	Word-formation to get antonyms	Retrieval, comprehension	0 0.00%	
		Q 3	Combining sentences with connectors	Retrieval, comprehension	0 0.00%	
		Q 4	Classification (matching)	Retrieval, comprehension	0 0.00%	
		Q 5	Fill-in-the gaps	Retrieval, comprehension	0 0.00%	
	Activity Three Written Expression	Topic One	Composition writing using provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Multiple representations ● Schema assembly 	1 8.33%
		Topic Two	Composition writing with no provided notes	Retrieval, comprehension, analysis, knowledge utilization	<ul style="list-style-type: none"> ● Avoidance of oversimplification and overregularizations ● Multiple representations ● Schema assembly ● Multiple interconnectedness 	1 8.33%

الموضوع الثاني

Part One: Reading A/ Comprehension

(14 points)
(07 pts)

Read the text carefully and do the activities.

Child abductions and kidnappings are on the increase, with almost 900 reported cases in the past year alone. Thus, the abduction of children by people other than their parents rose twice as fast as parental abductions.

During 2013-14, 158 children were abducted by parents, 401 children were abducted by people other than their parents, and 321 children were kidnapped. Kidnappings, which are defined by the use of force or fraud to remove a child, include cases such as children taken in return for a ransom. One-fifth of all kidnappings recorded by police involve a child victim. The figures include both successful and attempted crime. However, the charity Parents and Abducted Children Together (PACT) believes that many cases of attempted abduction and kidnapping involving children are never recorded by police, and the true rates of offending may be four times higher than police figures suggest.

Claude Knights, chief executive of the charity "Kids cape", said the figures were an important reminder to parents about the need to talk to children about so-called "stranger danger". An experiment carried out by the charity found that most children could be easily convinced to follow a stranger, even where parents felt they had talked to them about the risks involved.

Adapted: Hannah Fearn. "The Independent" Sunday, 22 Feb, 2015

1. *Are these statements true or false? Write T or F next to the letter corresponding to the statement and correct the false one(s).*
 - a. No cases of parental abductions are reported.
 - b. Kidnapping children does not always involve the use of force.
 - c. The police figures suggest the exact rates of child kidnappings.
 - d. Parental advice doesn't always prevent child kidnappings.
2. *In which paragraph is it mentioned that some children are kidnapped for an amount of money demanded?*
3. *Answer the following questions according to the text.*
 - a. Has the phenomenon of child abductions and kidnappings slowed down? Justify.
 - b. Are children abducted by strangers only? Justify.
 - c. How do kidnappings differ from abductions?
 - d. What is recommended to prevent this phenomenon from getting worse?
4. *Who or what do the underlined words refer to in the text?*
 - a. cases (§1)
 - b. their (§1)
 - c. them (§3)
5. *Give the general idea of the text.*

B/ Text Exploration

(07 pts)

1. Find in the text words whose definitions follow:
 - a. that relates to the father and/or the mother (§1)
 - b. statistics made from a report (§2)
 - c. organization that provides support and assistance (§3)
2. Complete the chart below as shown in the example.

	Noun	Verb	Adjective
Example	abduction	abduct	abducted
	.....	.....	inclusive
	safety	.....	.....
	.....	offend	.....

3. Connect each pair of sentences with one of the words given. Make changes where necessary.
 or - although - as a result - in order to
 - a. Children are deceitfully convinced. Children are easily kidnapped.
 - b. Kidnappers are severely punished. Child abductions rates are still on the increase.
 - c. Parents communicate with their children. They do not want them to be deceived.
4. Classify the following words according to their stressed syllable.
 abduction - successful - charity - experiment

1 st syllable	2 nd syllable	3 rd syllable

5. Reorder the following statements to make a coherent passage.
 - a. the national police force recorded a rise in the number of disappearing children in Algeria.
 - b. Among the disappearing children,
 - c. In a report published last April,
 - d. 798 of them were abducted.

Part Two: Written Expression

(06 points)

Choose ONE of the following topics.

Topic One:

Child abduction and kidnapping have become a daily source of concern for almost every family. In your opinion, what are the necessary and urgent measures to be taken to prevent such a crime? Using the following notes, write a composition of about 80 to 100 words.

- keep away from strangers
- avoid anonymous Internet friends
- sensitize children about the problem
- no child's personal information given online
- adopt strict laws to punish kidnapers

Topic Two:

Write a composition of about 80 to 100 words about the following topic:
 What comes first, success or happiness? State your opinion.

انتهى الموضوع الثاني

الموضوع الثاني

Part One: Reading
A/ Comprehension

(14 points)
(07 pts)

Read the text carefully and do the activities below:

Whistleblowing is the act of telling the authorities or the public that the company you are working for is doing something immoral or illegal. **This** represents a positive reaction towards all kinds of malpractices.

One of the most valuable whistleblowing benefits is that it enables organisations to access hard-to-reach information that can help leaders to minimize a wide range of risks. In many cases, whistleblowing has also a preventive impact. The presence of a whistleblowing system will make potential wrong-doers think twice.

According to the Association of Certified Fraud Examiners (ACFE), whistleblowing benefits organisations through significant loss savings. The ACFE's Report to the Nations showed that organisations which did not have a whistleblowing system in place suffered more losses than **those** who had it.

To gain greater whistleblowing benefits, organisations should implement a secure whistleblowing system that allows for anonymous reporting. An anonymous reporting channel gives people more self-confidence to speak up. This will increase the chances of leaders to receive critical reports and thus will enable them to take action against the offenders.

Globally, there is a trend towards stricter anti-corruption and whistle-blower protection laws. **Such a system** in place for whistleblowing benefits organisations by reducing compliance risks.

Adapted from www.whistleb.com / March 21- 2019 Whistle B Blog.

1. Say whether the following statements are True or False..

- a- Whistleblowing consists in revealing companies' misconduct.
- b- It is difficult to access the information that shows unethical behaviours.
- c- Denunciation of malpractices causes great losses.
- d- Whistle-blowers should be protected.

2. Identify the paragraphs in which the following ideas are mentioned.

- a- Stringent regulations should be passed to safeguard the whistle-blowers' lives.
- b- Whistleblowing saves money.

3. Answer the following questions according to the text.

- a- Is whistleblowing an immoral practice?
- b- What are the benefits of whistleblowing?
- c- How can we encourage whistle-blowing?

4. Find what or who the underlined words in the text refer to.

- a- this (§1)
- b- those (§3)
- c- such a system (§5)

5. Give a title to the text.

B/ Text Exploration

(07 pts)

1. Find in the text words or phrases that are closest in meaning to the following.

a- reduce (§2) = b- profits (§3) = c- submission (§5) =

2. Divide the following words into roots and affixes.

immoral preventive compliance

<i>prefix</i>	<i>root</i>	<i>suffix</i>

3. Combine each pair of sentences with one of the connectors provided. Make changes where necessary.

unless - so that - despite - after

- a- Whistleblowing is necessary. A lot of companies are not in favour of whistleblowing.
b- Companies apply whistleblowing rules. Companies suffer great financial losses.

4. Classify the following words according to the stressed syllable.

Information - protect - authorities - minimize

<i>1st syllable</i>	<i>2nd syllable</i>	<i>3rd syllable</i>

5. Fill in the gaps with words from the list given.

preventive - law - benefits - public - denounce - their

Some employees think they are blowing the whistle when their complaint is a personal grievance. Workers who ...(1)... their employers' abuses should believe that they are acting in the ...(2)...interest. They should not act for ...(3)...own benefits. This means that personal grievances and complaints are not usually covered by whistleblowing ...(4)... .

Part two: written expression

Choose ONE of the following topics.

(06 points)

Topic One:

You work for a company whose manager does not respect labour standards.

Write a letter of about 80 to 120 words to the authorities in which you denounce his wrongdoings.

The following notes may help you:

- Break the regulations
- Precarious working conditions/ low salaries
- Disrespect the code of ethics

Topic Two:

Your English key pal is conducting a research on historical sites in Algeria. He/ she asked you to supply him/her with information about these places.

Write an email of about 80 to 120 words telling him/her about one of these historic places.

انتهى الموضوع الثاني

الموضوع الثاني

Part One: Reading

(14 points)

Read the text carefully to do the following activities.

The young are the first victims of corruption in education, and **this** can affect the integrity and dignity of the person for life, as well as society at large. The social investment in future citizens fails when individuals can succeed dishonestly and without merit, increasing the number of incompetent future leaders and professionals. Not only society but even human life can be endangered by fake or untrained doctors, judges or engineers, or by poor quality scientific research carried out by corrupt academics.

Corruption in education most affects the poor and the disadvantaged, particularly women and minorities, who are unable to pay bribes for admissions or success. In areas such as rural Cameroon, students lose three school days per month due to absent teachers. The poor are also the least equipped to challenge corrupt behaviour. Whether the corrupt classroom kills ambition or children are forced to leave education altogether, vulnerable members of society lose the opportunity to realise **their** dreams and social inequality is maintained.

Corruption in education is particularly harmful in that it encourages a social acceptance of corruption at the earliest age. As young people rarely have the ability to question the rules of the classroom, they can internalise corrupt views of what it takes to succeed, and carry these forward into society. When this becomes a social norm, its cycle begins again in each generation.

Adapted From: Global Corruption Report: Education.(2013) Transparency international, p 20.

A/ Comprehension

(07 points)

- 1) *Say whether the following statements are true or false.*
 - a- Young people are the only victims of corruption in education.
 - b- Fake diplomas are not a menace to human life.
 - c- The less privileged cannot resort to corruption to succeed at school.
 - d- Corruption in education can produce a corrupt society.
- 2) *Identify the paragraph in which the following ideas are mentioned:*
 - a- Corruption in education does not affect only individuals.
 - b- The underprivileged have no means to act against corruption.
- 3) *Answer the following questions according to the text.*
 - a- What happens when individuals do not deserve their success at school?
 - b- Who is most affected by corruption in education?
 - c- What are the consequences of corruption in education on poor children's future life?
- 4) *Find who or what the underlined words in the text refer to.*
 - a- **this** (§1) b- **their** (§2)
- 5) *Give the general idea of the text.*

B/ Text Exploration

(07 points)

- 1) *Find in the text words or phrases that are closest in meaning to the following.*
 - a- Self-respect (§1) =
 - b- occasion (§2) =
 - c- adopt (§3) =
- 2) *Divide the following words into roots and affixes.*

- inequality - unable - acceptance

prefix	root	suffix

3) Ask questions which the underlined words answer.

- a- Corruption in education is dangerous because it affects society at large.
b- We can fight corruption by teaching moral values.

4) Classify the following words according to the pronunciation of the final "s".

encourages - fails - students - minorities

/s/	/z/	/ɪz/

5) Reorder the following sentences to get a coherent passage.

- a- Therefore, it is crucial to eradicate this social phenomenon.
b- Corruption in education threatens the well-being of society
c- It also hinders development by forming incompetent leaders and professionals.
d- because it erodes social trust and worsens inequality.

Part Two: Written expression

(06 points)

Choose ONE of the following topics:

Topic One:

The local newspaper has recently reported a scandal involving the headmaster of your school and some parents who paid bribes for the admission of their children. You felt upset and decided to react. Write a public statement of about 120 to 150 words to suggest solutions to eradicate such an unethical behaviour.

Make the best use of the following notes:

- Whistleblowing / Role of anti-corruption associations
- Effective civil service code
- Set strong accountability mechanisms

Topic Two:

Our modern civilization faces many threats (nuclear warfare, climate change...) which may lead to its collapse. Most of these menaces are the consequence of human activity. Write an opinion article of about 120 to 150 words for an electronic newspaper to urge the decision makers worldwide to take action to preserve our civilization from disappearing.



الموضوع الثاني

Part One: Reading

(14 points)

A/ Comprehension

(07 pts)

Read the text carefully and do the activities

The law in most countries demands that all children receive an education. However, do you know that a number of parents make special arrangements to educate their children at home? This happens mainly in cases where the child has serious health problems or learning difficulties.

Whatever the reason, there are some advantages to educating children at home. They can learn at their own speed. Furthermore, it is easier for them to concentrate since they don't have the distraction of noisy classmates. They learn more in a one-to-one situation, as they get the full attention of the teacher.

On the other hand, learning at home is not without drawbacks. For one thing, children who do not go to school lack experience at making friends with other children. As a result, they do not learn the social skills needed in later life. Moreover, they are less motivated to work hard, because they have no one to compare their progress with and to compete against.

All things considered, children should go to school. Education is not only a matter of learning facts and figures but also how to get along with others, and to develop their personalities. They can only do this by mixing with other children in a school environment.

*Virginia Evans – Jenny Dooley, Reading and Writing Targets,
Express Publishing 1999 (adapted)*

1- Say whether the following statements are True or False. Write T or F next to the letter corresponding to the statement and correct the false one(s).

- In most countries of the world, education is obligatory.
- Competition is one of the most important factors of motivation.
- Education is a matter of just facts and figures.

2- Identify the paragraph in which the following ideas are mentioned:

- Educating children at home is beneficial.
- Learning at home has disadvantages.

3- Answer the following questions according to the text.

- What makes some parents educate their children at home?
- What do home-educated children miss to learn?
- Is the writer for or against learning at home? Justify.

4- Find what or who the underlined words in the text refer to.

- their (§1): ...
- They (§2): ...
- this (§4): ...

5- Identify the type of discourse :

The text is ...

- narrative
- argumentative
- prescriptive



B/ Text Exploration

(07 pts)

1-Find in the text words or phrases that are opposite in meaning to

a) calm (§2) ≠ ...

b) separating (§4) ≠...

2-Give the opposites of the following words keeping the same root.

believe – educated – experience

3-Combine each pair of sentences with the connectors given between brackets. Make changes where necessary.

a) Children will develop their personalities. Children will mix with others. (**provided that**)

b) Children are less motivated. They have all the necessary means to learn at home. (**Despite**)

4-Classify the following words according to the stressed syllable.

education - environment - drawbacks - personality

First syllable	Second syllable	Third syllable

5-Fill in the gaps with only four words from the list given

visit – values – opportunity – teachers – create – educational

In some countries, families may organize home schools like a conventional school, with structured daily activities. Others view all of life as an(1)..... for learning and use a very flexible schedule. They provide ...(2)... experiences outside as well as inside the home. Their children may ...(3)... museums, work in a garden, or serve apprenticeships. Other families even ...(4)... their own materials.

Part Two: Written Expression

(06 points)

Choose **ONE** of the following topics

Topic One:

Although education is compulsory all over the world, some parents still do not send their children to school for various reasons. As a teenager aware of the children's right to education, write an expository article of about 80 to 120 words for your school magazine to analyse the causes and effects of such an issue.

Make the best use of the following notes:

- Education / compulsory
- Parents' responsibility
- social and economic problems / help their parents
- Cultural beliefs / girls deprived of school/ do housework
- Illiteracy / uncertain future

Topic Two:

Child labour has become a social evil, especially in the third world countries. Write a letter of about 80 to 120 words to the UNICEF representative in your country to denounce this unethical practice, and to urge this organization to take the necessary measures to eradicate this phenomenon.

Appendix 4: Students' Papers

No. ①

Hatred is an extremely strong feeling of dislike for someone or something and is manifest harmful, it can be directed against individuals, groups entities, objects, behaviors or ideas.

There are many things that cause hate like jealousy or comparatively more having like beauty, money or anything else, and also sometimes wrong understanding between people cause hate.

But the damaging effects of hatred are so powerful that they erode the human spirit as powerfully as any chemical toxic.

In conclusion, because of this ~~the~~ problem relation state getting

No. 1

appart between societies

No. (6)

because hatred generates anger

The best way to overcome hate is by asking yourself why? what am i hating that or this or him or her? just why? and then you will find that all of that hate was for nothing and for no reason and even if there were a reason you will realize that you really don't have to hate it or its just not worth hating it

(21)
No. 15

Hatred!!! This word is widespread in our countries and it is a real phenomena which is a negative feeling and it can destroy many societies, for this purpose we must think about solutions to eradicate it and what are the causes and the effects of this problem?

When we look around us, we find a lot of problems between the brothers cause of heritage for example or money, and also we find it between the friends and it can be jealous from his school friend or his beauty and his maybe from his good marks, there is a great difference between people and they can kill the others cause of religion or politic discords and now we move to the effects of this word, we find many families don't talk with the

M. 15

others, we find someone dislike his friend, so he kills him and only it can make wars between the countries for example in Iran, Palestine, Syria etc.

So, we conclude that this phenomena is very dangerous and we should find some solutions to diminish or we can say to stop it, we can teach our children in the schools and we tell them that is bad and unethical and it can destroy their personality and we ought to sensitize people of this danger word.

Na 19

Hatred is a phenomenon which is very harmful in our societies. It can destroy them, and causes many problems.

At first, hatred has many causes like: jealousy, malice, indifference when I jealousy some one I hate him, if I am malicious I hate the others. The cause can be also the heritage, wrong understanding between people, or when people is beautiful and even they have a small thing we hate them.

Then, the dislike causes many effects for example it erode the human spirit. Beco It stirs up trouble, it leads to murder, it and provokes sins of the tongue and it fosters resentment and retaliation also.

No. 19

Finally, we should stop this phenomenon by many solutions:
* do not let someone else manipulate you into being miserable. All of us need to understand that the only real solution is not more hate, but it is love, compassion, understanding and unity with our fellow humans.

No. 20

Hatred feels like such a strong emotion, but it leaves you weakened. Lacking kindness might be the answer. Hatred is a negative feeling can be destroy society and lead to war

- The destructive effects of hatred are very visible, very obvious and immediate, there might be some justification for responding to force with force if revenge would help some in any way, or prevent or reduce the harm which has already been inflicted

- if we examine how anger or hateful thoughts arise in us, we will find that generally speaking they arise when we feel hurt

No. 20

When we feel that we feel hurt

To Conclude, These emotions are very dangerous so to eradicate, we should teach pupils, women and even the men, that's mean that all the humanity should learn that love is very important in each other.

No.

25

Hatred is a dangerous and negative feeling in societies. Many peoples hate other persons in all the world, but the question "why hatred can destroy societies?" is remains.

This feeling have a lot of causes like jealousy, when one be jealous the result is hatred and dislike it, and Envy is also a cause of hatred in societies. This liste of causes are fragmented communities.

No. 38

In the proverb saying "Hate, it has caused a lot of problems in the world, but has not solved one yet" by Maya Angelo, my favorite writer, she summarized the role of hatred not only in the society but also in the whole wide world; that it hasn't done anything good to humans, us.

Hatred is a very intense feeling of dislike, according to researches it is also a disease known under the name of "animosity", it can kill a person, cause crimes, if this feeling goes out of control.

But hatred in the society is worse than hatred between a person and another, and no one could deny the damaging effects of it that are so powerful that they kill the human spirit as powerfully as a venomous snake. It is the cause of present day conflicts; 70% of these conflicts are due to hatred, religious racism amongst countries. It is the vicious that poisons our children, youngsters and adults, the never ending judgments

(38)

No. 38

and critics, the rejecting glares of total non-acceptance, the manipulative slavery and arrogance of the bosses towards their workers, now this act leads to holding grudges and that may lead to the disaffection by the employees, and even to the destruction of the companies.

Yes hatred is really a virus, it has caused enough trouble in the past few years, but enough with that, and like every problem, hatred has its solutions which are: people should be sensitized about the importance of love and to be reminded of the sweetest feeling that love gives to a person. help spread peace in the society for it is the best and purest feeling in humanity. Hate must be countered with acts of goodness, love the people around, love your friends, your family, love your country, for a true patriot fights hatred. This is not a letter to read and close, it is to read and act, we can stop it now and replace it with love.

Let me help at least by a proverb of my creation: Living with lies and hatred was

No. 39

Hatred is an extremely strong feeling of dislike for someone or something the feeling of one who hates; intense dislike or extreme aversion or hostility and there are a lot of reasons why most people would hate a person; we can be mentioned.

- Because they want to be like you people who want to be like you but can't might hate you. while a psychologically stable person will just hate anyone who is better than him

- Because they need to feel good about them selves; so many people hate others to elevate their own self esteem and feel better about themselves people could be hating you because they have self esteem issues and not because you are bad or defective
- Because you remind them of their failure when people see your success

No. 39

and remember that they don't have any, they might hit you for it. Brave people will try to be successful as well, while others will hate you, and they are more vicious. and the hate result is always remember others may hate you, but those who hate you don't win unless you hate them and then you destroy yourself.

All of this hatred from both sides of the street has to end in the nation's capital, state capitals cities and towns and in the streets. otherwise we will destroy ourselves.

It is high time people found solutions to this phenomena; we ought to sensitize people about this evil and we should advise them to leave this ideas behind them people have to respect the others opinions and

No. 44

Hatred in our society

Much like love, hatred is often blind, making human beings prone to believe things that simply are not true. Sadly, too many of us fall victim to this reality, resulting in feelings of animosity and prejudice with little or nothing to back it up. As such, it has wreaked havoc on the world for centuries and will probably continue to do.

Common examples of hatred are Racism, Religious and politically-based hatred,

I think the root causes of hate is a lack of attachment, a formed identification, relationship, connection, commonality. I can easily hate you from a distance. I don't know you.

No. 44

Also, there are many things that cause hate like jealousy or comparatively more having like beauty, money or anything else. And also sometimes wrong understanding between people cause hate.

These all are the symptoms that may cause you hate in future.

Hate has many bad effects on societies. It can destroy it.

It is important to see, feel and understand. Hating is just doling out more of the same thing that you do not like in others, or in the world. "He hurt me, so I will hate him", that is the motto of the hater. A better approach is "He hurt me, so I will not hate him back, I will love and forgive as best I can". So, we must fight hate in all the world. You must try to catch yourself in your anger and hate, and asking God to intervene in your life and remove your hate. Also, the important step is to begin tolerance with others.

No. 44

At the end, 'It' is time for all of us to fight back against hate and to live in love, happiness and peace where there is never hatred. No to hatred.

"Islam teaches tolerance, not hatred; universal brotherhood, not enmity; peace, and not violence".

(51)

We must fight hatred because it can destroy societies, so we have to be mature and accept others like they are, respect their thoughts, understand their pain and giving help to everyone they need it, we should open our hearts and choose to be happy and keep hand by hand to build our society, not to destroy it.

At the end, I say that we must learn how to love, because love is the most beautiful emotion that has a great meaning and we have to be honest in our feelings to fight hatred and prevent it at all.

Hatred. No. 58

Hatred is feeling of one who hates, intense dislike or extreme aversion, or hostility, that feeling can cause great damages in our society.

The principal cause of hatred is the wrong education of children, because parents teach them how they hate not how they love and live in peace. So, education and breeding of children are the base to build perfect country.

If hatred widespread in any society it will destroy it and obstruct the progress and the advancement of this country.

The only solution to stop hatred is to teach our children how they love and how they collaborate with others to live in peace and love without any violence or hatred.

To build elegant and cultured society and perfect country we must take care and love our children.

Résumé

La présente étude examine le développement des compétences en résolution de problèmes en anglais comme langue étrangère (EFL) chez les élèves algériens du secondaire se préparant à l'examen du Baccalauréat. Suivant une perspective socioconstructiviste, la recherche a exploré trois axes clés : (1) l'adéquation du programme actuel d'anglais, des manuels scolaires et des examens du baccalauréat à la résolution de problèmes complexes ; (2) les perceptions et attitudes des enseignants d'anglais quant à l'intégration de la résolution de problèmes en classe ; ainsi (3) l'efficacité du modèle de résolution de problèmes de Polya pour améliorer les capacités des élèves en résolution de problèmes. L'étude a été menée sous différents angles, en insistant sur la triangulation. En effet, une approche mixte a été employée, combinant analyse documentaire, enquête auprès des enseignants, et étude expérimentale. Le manuel *New Prospects* a été évalué à l'aide des taxonomies de Bloom et de Quellmalz, le programme scolaire selon le modèle 3C3R de Jung, et les examens du baccalauréat selon la théorie de la flexibilité cognitive de Spiro et al. conjointement avec la taxonomie de Marzano. Les points de vue des enseignants ont été recueillis au moyen d'un questionnaire. Le groupe expérimental a reçu un enseignement basé sur le modèle de Polya. Le groupe témoin comprenait 30 élèves, tandis que le groupe expérimental comprenait un total de 36 participants. Les résultats ont révélé une intégration limitée de la résolution de problèmes dans les supports évalués, indiquant que le programme intégrait des éléments clés du modèle 3C3R, mais ne mettait pas l'accent sur la résolution de problèmes. De plus, les résultats ont montré que moins de 20 % des activités des manuels et des tâches d'examen ciblaient explicitement ces compétences. Les enseignants ont exprimé une attitude positive envers la résolution de problèmes, mais ont signalé des difficultés dans sa mise en œuvre. L'étude expérimentale a démontré une amélioration statistiquement significative ($p < 0,0005$) des performances en résolution de problèmes chez les élèves exposés au modèle de Polya ($M = 9,21$, écart-type = 1,87) par rapport au groupe témoin ($M = 6,82$, écart-type = 1,81). Ces résultats soulignent la nécessité de mettre davantage l'accent sur la résolution de problèmes dans le contexte de l'anglais comme langue étrangère et suggèrent les avantages potentiels de l'intégration des modèles structurés de résolution de problèmes comme celui de Polya. L'étude propose des recommandations pour la révision des programmes, le développement du matériel pédagogique et la formation des enseignants afin de mieux doter les élèves des compétences essentielles en résolution de problèmes.

Mots Clés : Résolution de problèmes ; les classes d'examen des écoles secondaires algériennes ; Evaluation ; Programme d'Anglais (3AS), BAC Anglais, Enseignants d'Anglais.

ملخص

تبحث هذه الدراسة في تطور مهارات حل المشكلات في اللغة الإنجليزية كلغة أجنبية (EFL) لدى طلاب المرحلة الثانوية الجزائريين المستعدين لامتحان البكالوريا. ومن منظور اجتماعي بنائي، استكشف البحث ثلاثة مجالات رئيسية: (1) مواءمة مناهج اللغة الإنجليزية كلغة أجنبية الحالية والكتب المدرسية وامتحانات البكالوريا مع حل المشكلات المعقدة؛ (2) آراء معلمي اللغة الإنجليزية كلغة أجنبية ومواقفهم تجاه دمج حل المشكلات في فصولهم الدراسية؛ و(3) فعالية نموذج بوليا لحل المشكلات في تعزيز قدرات الطلاب على حل المشكلات. وقد دُرست المسألة من زوايا مختلفة مع التركيز على طريقة التثليث. في الواقع، استُخدم نهج مختلط الأساليب، يجمع بين تحليل الوثائق، واستطلاع آراء المعلمين، والدراسة التجريبية. تم تقييم كتاب "آفاق جديدة" باستخدام تصنيفي بلوم وكويلمالز، والمنهج الدراسي تم تقييمه وفقًا لنموذج يونغ C3R3، وامتحانات البكالوريا باستخدام نظرية المرونة المعرفية لسبيرو وآخرين وتصنيف مارزانو. جُمعت آراء المعلمين من خلال استبيان. تلقت المجموعة التجريبية تعليمًا قائمًا على نموذج بوليا إذ ضمت المجموعة الضابطة 30 طالبًا، بينما ضمت المجموعة التجريبية 36 مشاركًا. كشفت النتائج عن دمج محدود لحل المشكلات في المواد المقّمة، مما يشير إلى أن المنهج الدراسي تضمن العناصر الرئيسية لنموذج C3R3 ولكنه لم يركز على حل المشكلات. بالإضافة إلى ذلك، أظهرت النتائج أن أقل من 20% من أنشطة الكتب المدرسية وأنشطة الامتحانات تستهدف هذه المهارات صراحةً. أعرب المعلمون عن مواقف إيجابية تجاه حل المشكلات ولكنهم أبلغوا عن تحديات في تطبيقه. أظهرت الدراسة التجريبية تحسناً ذا دلالة إحصائية ($p > 0005$) في أداء حل المشكلات للطلاب الذين تلقوا تعليمًا لنموذج بوليا (المتوسط = 9.21، الانحراف المعياري = 1.87) مقارنةً بالمجموعة الضابطة (المتوسط = 6.82، الانحراف المعياري = 1.81). تسلط هذه النتائج الضوء على الحاجة إلى زيادة التركيز على حل المشكلات في سياق اللغة الإنجليزية كلغة أجنبية، وتشير إلى الفوائد المحتملة لدمج أطر عمل منظمة لحل المشكلات مثل نموذج بوليا. تقدم الدراسة توصيات لمراجعة المناهج الدراسية، وتطوير المواد التعليمية، وتدريب المعلمين لتزويد الطلاب بمهارات حل المشكلات الأساسية بشكل أفضل.

كلمات المفاتيح: حل المشكلات في اللغة الإنجليزية كلغة أجنبية، صفوف امتحانات المدارس الثانوية الجزائرية، تقييم، سجلات الكتاب المدرسي "آفاق جديدة"، المنهج الدراسي، امتحانات البكالوريا في اللغة الإنجليزية، معلمي اللغة الإنجليزية كلغة أجنبية