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The Use of Visible Thinking Routines in Enhancing EFL
Students' Critical Thinking Skills.
Case Study: Second Year EFL Students at Chadli Bendjedid
University El Taref

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Dedication

I dedicate this research work:

To my family and my loving parents whose words of encouragement motivated me and made me believe in myself to reach higher places; ‘El Nour’ and ‘Souad’ thank you so much .

To my sisters who are very special to me: Meriem, Bouthaina , Fadwa and to my little brother Ahmed who never left my side.

I also dedicate this dissertation to my classmates who have supported me throughout the process. I will always appreciate what they have done for me.

Naoui Madjda.

Dedication

All praises to Allah, the most Merciful, for the completion of this dissertation.

I dedicate this work to the memory of my father Mr. Abd Elmadjid Bouguerra, the lamp that lighted and still lights the way for me wherever I go, and to my beloved mother for her care, prayers and love.

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Table of Content

Dedication.....	II
Aknowledgments	IV
Table of Contents.....	V
List of Tables	X
List of Figures.....	XI
List of Abbreviations.....	XII
Abstract.....	XIII
General Introduction.....	1
Statement of the Problem.....	2
Aim of the Study.....	2
Research Questions	3
Research hypotheses.....	3
Methodology	3
Limitations of the study	3
Structure of the Study	4
Chapter One: Literature Review.....	5
Introduction.....	5
1. Critical Thinking.....	5

1.1.Definition of Critical Thinking.....	5
1.2.Characteristics of Critical Thinking.....	6
1.2.1. Reasoning.....	7
1.2.2. Reflection.....	8
1.2.3. Creativity.....	8
1.3. Components of Critical Thinking.....	9
1.3.1. Dispositions.....	10
1.3.2. Component Processes.....	11
1.4.The importance of Critical Thinking IN Language Teaching.....	11
1.5. Critical Thinking Assessment.....	12
2. Visible Thinking.....	13
2.1. Definition of Visible Thinking.....	13
2.2.Making Thinking Visible: Supporting and Scaffolding Learning and Thinking	14
2.2.1. Questioning:.....	15
2.2.2. Listening.....	16
2.2.3. Documenting.....	16
2.3.Visible Thinking Routines.....	17
2.3.1. Routines for Introducing and Exploring Ideas.....	18
2.3.1.1.See-Think-Wonder.....	18
2.3.1.2.Zoom In.....	19
2.3.1.3.Think-Puzzle-Explore.....	19
2.3.1.4.Chalk Talk.....	20
2.3.1.5.321 Bridge.....	20
2.3.1.6.Explanation Game.....	21
2.3.2. Routines for Synthesizing and Organizing Ideas.....	21

2.3.2.1.The 4 C's.....	21
2.3.2.2.Generate-Sort-Connect-Elaborate: Concept Maps.....	22
2.3.2.3.The Micro Lab Protocol.....	22
2.3.2.4.Connect-Extend-Challenge.....	23
2.3.2.5.I Used to Think..., Now I Think.....	24
2.3.3. Routines for Digging Deeper into Ideas.....	24
2.3.3.1.What Makes You Say That?.....	24
2.3.3.2.Circle of Viewpoints.....	24
2.3.3.3.Step Inside: Perceive, Know About, Care About.....	26
2.3.3.4.Red Light, Yellow Light.....	26
2.3.3.5.Tug of Wars.....	26
2.3.3.6.Claim-Support-Question.....	27
Conclusion.....	27
Chapter Two: Methodology, Results and Discussion.....	28
Introduction.....	28
2.1. The Research Location.....	28
2.2. Participants.....	28
2.3. The Research Instruments.....	29
2.3.1. The Pretest and the Posttest.....	29
2.3.2. Students' Questionnaire	30
2.4.The Research Design and Procedures.....	30
2.4.1. The Pretest.....	31

2.4.2. The Treatment.....	31
2.4.3. The Posttest.....	34
2.4.4. Students' Questionnaire	34
2.5.Data Analysis.....	34
2.5.1. The Pretest.....	34
2.5.1.1.The Pretest Overall Scores.....	35
2.5.1.2.The Pretest Scores According to Each Section.....	36
2.5.2. The Posttest.....	37
2.5.2.1.The Posttest Overall Scores.....	37
2.5.2.2.The Posttest Scores According to Each Section.....	38
2.5.2.3.Comparison between Pretest and Posttest Means.....	39
1.1.1.1.Students' Questionnaire Analysis.....	39
1.2.Findings and Discussion.....	42
Conclusion.....	44
Chapter Three: Implications and Recommendations.....	45
Introduction.....	45
3.1. Implications.....	45
3.2. Recommendations and suggestions.....	45
3.2.1. For Students.....	45
3.2.2. For teachers.....	46
3.2.3. For Educational system.....	47
3.2.4. Recommendations for further studies.....	48

Conclusion.....	48
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General Conclusion.....	49
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References.....	50
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APPENDICES

LIST OF TABLES

Table	Page
Table 2.1. The Pretest Overall Scores.....	35
Table 2.2. The Pretest Scores According to Each Section.....	36
Table 2.3. The Posttest Overall Scores.....	37
Table 2.4. The Posttest Scores According to Each Section.....	38
Table 2.5. Paired Samples Statistics.....	39
Table 2.6. The Participants'' Background Information.....	40
Table 2.7. The Participants' Reflections towards Visible Thinking Routines.....	41

List of Figures

Figure	Page
Figure2.1. The Pretest Overall Scores.....	35
Figure2.2. The Pretest Scores According to Each Section.....	36
Figure2.3. The Posttest Overall Scores.....	37
Figure2.4. The Posttest Scores According to Each Section.....	38
Figure2.5. Paired Samples Statistics.....	39

List of Abbreviations

EFL: English as a Foreign Language

ESL: English as a Second Language

CT: Critical Thinking

CTS: Critical Thinking Skills

VTR: Visible Thinking Routines

W-GCTA: Watson Glaser Critical Thinking Appraisal

WGCTA-FS: Watson-Glaser Critical Thinking Appraisal Form Short

Abstract

The present study examined the effects of Visible Thinking Routines (VTR) in enhancing EFL Algerian students' critical thinking skills. Following the one group pretest/posttest design, the data were collected through Watson-Glaser Critical Thinking Appraisal (W-GCTA), which was applied on 30 second year students from the department of English at Chadli Bendjedid University. The participants took the pretest in order to measure their level of thinking. Along with applying the visible thinking routines, they had four sessions of treatment followed by an online posttest to measure the effectiveness of the treatment. Both pretest and posttest were examined and assessed by the researchers following the same assessment procedure. Following the treatment, an online questionnaire was distributed to the participants to investigate their reflections regarding the effectiveness of these routines in enhancing their thinking skills. The findings of the study indicated that there were positive changes occurred in responding to the tests and participating in the treatment as the participants' scores have remarkably increased in the posttest results. In the light of the experiment results, EFL teachers were recommended to use thinking routines in enhancing students' critical thinking skills and researchers have provided a set of suggestions and recommendations in order to foster the process of learning and teaching.

Keywords: critical thinking, visible thinking, EFL students' critical thinking skills, learning and teaching.

ملخص

تناولت الدراسة الحالية آثار إجراءات التفكير المرئي في تعزيز مهارات التفكير النقدي للطلاب الجزائريين في اللغة الإنجليزية كلغة أجنبية. باتباع تصميم المجموعة الواحدة للاختبار القبلي / الاختبار البعدي ، تم جمع البيانات من خلال تقييم التفكير النقدي (، والذي تم تطبيقه على 30 طالبًا في السنة الثانية من قسم اللغة الإنجليزية في جامعة Watson-Glaser (W-GCTA الشاذلي بن جديد. أخذ المشاركون الاختبار القبلي من أجل قياس مستوى تفكيرهم. إلى جانب تطبيق إجراءات التفكير المرئي ، خضعوا لأربع حصص متنوعة باختبار لاحق عبر الإنترنت لقياس فعالية إجراءات التفكير المرئي. تم فحص وتقييم كل من الاختبارين القبلي والبعدي من قبل الباحثين باتباع نفس إجراءات التقييم. بعد المعالجة تم توزيع استفسار للمشاركين لمعرفة آرائهم حول فعالية هذه الإجراءات في تحسين تفكيرهم . أشارت نتائج الدراسة إلى حدوث تغييرات إيجابية في الاستجابة للاختبارات والمشاركة في الحصص حيث زادت درجات المشاركين بشكل ملحوظ في نتائج الاختبار اللاحق. في ضوء نتائج التجربة ، تمت توصية أساتذة اللغة الإنجليزية كلغة أجنبية باستخدام إجراءات التفكير المرئي في تعزيز مهارات التفكير النقدي لدى الطلاب وقدم الباحثون مجموعة من الاقتراحات والتوصيات من أجل تعزيز عملية التعلم والتعليم.

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الكلمات الرئيسية: التفكير النقدي، التفكير المرئي، مهارات التفكير النقدي لطلاب اللغة الإنجليزية كلغة أجنبية، التعلم والتعليم والتدريس

General Introduction

Introduction

Developing students' critical thinking is a major area of concern within the domain of educational settings. Nickerson (1994) stated that students are in need to develop critical, coherent, and creative thinking to accurately master the language and to critically deal with the constant changes and challenges of the modern society. They also need these skills to be able to analyze, examine and synthesize the information they receive, not only in class but also in their daily lives. Nevertheless, foreign language teachers are still facing challenges in designing innovative pedagogical approaches to make learning classrooms more engaging and mentally stimulating since they have recognized that learning language through a rote memorization of vocabulary and grammatical rules is no longer an adequate pedagogy. (Alnabulsy, 1995)

A considerable number of studies in English language teaching indicated the need to develop and use creative teaching approaches and strategies to improve students' CTS (AL-Husny, 2002; Al-Zyadat, 2003; Khasawneh, 2004; Lumpkin, 1992). Therefore, different teaching approaches and strategies to the development of higher order thinking skills have been used and investigated over the years such as the McFarland strategy, Smith Strategy, Orelly strategy, Problem-Based Learning approach and E-Learning ...etc. Recently, a mixed -methods approach known as the Visible Thinking Approach has also been identified as an effective approach to enhance students' level of cognition and stimulate their thinking. This approach advocates the use of practical routines called Visual or Visible Thinking Routines (VTR) which promote creative thinking by making learning and thinking visible for students. Hence, the present study aims to explore the extent to which these routines are effective to set young minds' thinking and improve critical thinking skills (CTS) of EFL students.

1. Statement of the Problem

CTS are considered as the 21st century skills that allow students to improve their level of cognition and foster language proficiency. They are considered as a must for teachers to equip their students with the needed CTS and train them to not accept anything for granted. Accordingly, confidence, aptitude, and problem solving of CT would assist students to achieve higher proficiency in their studies. Making thinking visible for them is the best way to achieve that goal via applying a number of routines which are mainly set to manage and facilitate the accomplishment of specific goals and tasks in the classroom in order to structure the learning process that students go through. However, the jumping to conclusions type of learning is still the most used one in English language teaching classes that promotes nothing but being passive students and later on passive workers. Thus, schools should be less concerned with imparting information and requiring the memorization of empirical data but to view students' thinking as an outgoing process that seeks to find answers and enhance their skills to face any problem with success. Ken Robinson (2006) claimed that school kills creativity and when one looks beyond students' awkwardness, anxiety, and lack of communication skills necessary to master their thinking; he/she will notice that there is a gap that should be filled by supporting and scaffolding the process of learning, only by making thinking visible.

2. Aims of the Study

This study aims to investigate the use of VTR in enhancing students' CTS. Specifically, it seeks to shed light on the use of an extensive and adaptable collection of practices to integrate the development of students' CTS with content learning across subject matters. Visible Thinking has double purposes: on the one hand, to cultivate students' thinking skills and dispositions, and, on the other hand, to deepen content learning. By thinking dispositions, we mean inquisitiveness, understanding, and nurturing a creative mind-set.

3. Research Questions

The present study aims to answer the following questions:

- 1) – How do VTR affect EFL students' Critical Thinking skills?
- 2) - What are EFL students' reflections regarding the changes that take place as a result of the implementation of VTR?

4. Research hypotheses

We hypothesize that:

- 1) - VTR would improve and reinforce students' thinking skills and understanding of different arguments and facts.
- 2) – The Students would have positive perceptions and reflections regarding the effectiveness of VTR in enhancing their thinking skills.

5. Methodology

In order to achieve the research objectives, mixed methods have been used to answer the research questions and test the hypotheses' validity. First , an experimental design has been used to get a deeper insight into the idea of VTR and CTS. Accordingly, 30 second year EFL students took a test adopted from Watson Glaser Critical Thinking Appraisal (W-GCTA) before and after the treatment and the results of the experiment were analyzed and discussed in relation to the research questions and hypotheses. Then , a questionnaire was administered to the students after the treatment to explore their perceptions and reflections towards VTR.

6. Limitations of the Study

This research was influenced by two main limitations. First, the lockdown that Algeria was going through because of the spread of Corona virus hindered our work and forced us to use online alternatives. Also the fact that our research is dealing with CT and visible thinking program, which are new concepts, we had some difficulties to have access to the primary sources.

7. Structure of the Study

The present study consists of three chapters:

The first chapter reviews the literature on the idea of CT and VTR. The first part of the chapter explains the concept of Ct, its features and its importance . The second part deals with the main characteristics of visible thinking and its different routines.

The second chapter describes the methodology applied, the research instruments, the participants, and the procedure followed in the study. The results from both the experiment and students' questionnaire are presented and discussed according to the research questions.

The last chapter presents some suggestions and recommendations for EFL teachers, EFL students and for the educational system. Finally, some potential research areas and topics for future researchers are proposed .

Chapter One

Literature Review

Introduction

This chapter is an overview of the research variables. It deals with the concept of CT, including its definition, characteristics, components, importance, and its assessment procedure. Furthermore, it discusses the process of making thinking visible, and finally provides detailed information about the different VTR.

1. Critical Thinking

1.1. Definition of Critical Thinking

The word ‘Critical’ is derived from the Greek word ‘*kritikos*’ meaning to judge; it arose from the way Socratic argument and analysis comprised thinking at that time (McGregor, 2007). Then, the word passed to all world languages and devolved to have a more powerful meaning (Hançerlioğlu, 1996). According to the Critical Thinking Cooperation (2006), CT is an ability which is beyond memorization; it is the thoughtful thinking in the pursuit of relevant and reliable knowledge that enables an individual to ask appropriate questions, gather relevant information, logically and creatively sort through this information and come up with reliable and trustworthy conclusions about whatever matter in hand.

The psychologist Glaser (1942) defined CT as an attitude and logical application of skills in problem-solving contexts. Further, Ennis (1962) defined it as a logical process and product-oriented phenomena, while characterizing it as the correct assessment of statements. Current conceptualizations suggest that CT is a process of purposeful reflection that requires logic (Brookfield, 1987; Ennis, 1989; Paul, 1992; Sternberg, 1986). From the mid-1990s to the present, researchers have maintained that CT is dependent on pre-dispositions and purposeful reflection

(Ennis, 1993; Facione, 1990; Paul, 1997). These definitions rooted in two primary academic disciplines: philosophy and psychology (Lewis & Smith, 1993). A different CT stand within the field of education was proposed by Sternberg (1986) along with Ennis (1989) and Lipman (1988) who believed that CTS are not a fixed entity, but they are a form of intelligence that can be taught and learned.

Many educators utilized Bloom's taxonomy to structure their teaching and assessing higher order skills. Bloom's taxonomy is a hierarchical multi-tiered model of classifying thinking to six cognitive levels of complexity arranged from the lowest three levels which are: knowledge, comprehension and application followed by analysis, synthesis and evaluation for the higher levels (Bloom, 1956). Then, this hierarchical taxonomy was revised by Anderson (2001) who added remembering, understanding and applying to the lower levels and analyzing, evaluating and creating to the higher levels. Achieving CT in classrooms is not a matter of increasing the sheer volume of materials taught and telling students to study harder, but it is about the type of content involved and how the learning process proceeds.

Huitt (1998) proposed another definition in which the concept of CT was closely aligned to the evaluation level. Bloom et al (1956) also maintained that CT refers to the mental activity of evaluating arguments or propositions and making judgments that can guide the development of beliefs and taking actions.

1.2 Characteristics of Critical Thinking

Being a critical thinker is not a matter of being argumentative or making judgments on other people, neither a matter of having a huge amount of information available. For Lau (2011) "a critical thinker is someone who is able to do the following:

- Understand the logical connections between ideas.

- Formulate ideas succinctly and precisely.
- Identify, construct, and evaluate arguments.
- Evaluate the pros and cons of a decision.
- Evaluate the evidence for and against a hypothesis.
- Detect inconsistencies and common mistakes in reasoning.
- Analyze problems systematically.
- Identify the relevance and importance of ideas.
- Justify one's beliefs and values.
- Reflect and evaluate one's thinking skills. (p.02)

Furthermore, a recent study by Butterworth and Thawaites (2013) on CTS pointed out that “the main essential characteristics for a person to think critically are: reasoning, reflection and creative thinking” (p.02).

1.2.1. Reasoning

Reasoning is the most important element of Critical Thinking. Without the process of reasoning people are not capable to think logically and make wise decisions. Butterworth and Thawaites (2013) stated that: “Reasoning is the process of thinking by which we advance from our prior knowledge to new knowledge and understanding. Being rational for a course of some facts or beliefs in a logical way to form conclusion or judgment with confidence” (p.02). In accordance, Khemlani (2018) defined reasoning as: “Reasoning is a mental process of drawing

inferences or conclusions from facts and information available based on observations or premises” (p.388).

1.2.2. Reflection

Butterworth and Thawaites (2013) stated that “the aim of the reflective thinker is not only making the decision to solve a problem neither to obtain an argument or a debate, but also focusing on the thinking processes that he/she goes through” (p.02). Reflection involves thinking about thinking in which it helps to stimulate student’s meta-cognitive thinking. It is important to activate students’ alertness and make them think more confidently, more skillfully and more independently (ibid).

According to Developing Cambridge Learner Attributes (2011), there are two closely related types of reflection:

1. Reflecting on the learned knowledge and information in order to enhance deeper understanding of the course material.
2. Making learning itself an object of reflection to assist student self-regulation and build the sense of independent learning.

1.2.2. Creativity

Another important feature of CT is creativity. People become creative when they think outside the box to see a problem or issue from a new angle or perspective. Kampylis and Berki (2014) defined creativity as “the thinking that provides means for students to utilize their imagination to brainstorm ideas and information in a group work under the supervision of a director in which they come up with innovative ideas to solve a problem or create something

new” (p.06).Kaufman and Beghetto (2009) developed four categories of creativity in order to show the subtle distinction between each category which are:

- **Big-C creativity** (sometimes called ‘high’ creativity): “It is the higher type of creativity which describes the works made by an elite such as Einstein’s theory of relativity, Darwin’s theory of evolution, Picasso’s Guernica and Ludwig van Beethoven’s Symphony, etc” (ibid, p.06). Big-C creators are highly intelligent people and they are out of reach for the most of us.
- **Pro-c creativity:** This level of creativity involves time and training to get it, like learning how to play a guitar professionally or majoring in college (ibid).
- **Little-c creativity:** According to Craft (2005) little-c creativity is being flexible, intelligent and novel in everyday life. This type of creativity can be found in the kind of people who are able to resolve a complex problem at work, home or within society (Kaufman and Beghetto, 2009).
- **Mini-c creativity:** Beghetto &Kaufman (2007) defined “Mini-c as the innovative and true meaningful interpretation of experiences, actions, and events” (p.73). This level of creativity can be enhanced by teachers and parents via nurturing a creative mind-set for their students or kids.

Butterworth and Thawaites (2013) focused on the link between reasoning and creativity in which:“reasoning is required both to enable and to apply creative thinking, just as creative thinking is needed to give a spark to reasoning” (p.02).

1.3. Components of Critical Thinking

CT is not any thinking, it is the kind of thinking that takes conscious efforts and involves a set of different dispositions and component processes (Facione, 1990).

1.3.1. Dispositions

Researchers have suggested that dispositions are integral part of this construct as they motivate individuals to be engaged in solving problems and making decisions by using thinking (Facione, 1990). Dispositions can be explained as the way of acting towards or responding to persons, events, or circumstances in habitual, yet potentially malleable ways. This kind of behavior includes a tolerance for ambiguity, a willingness to suspend judgment, and being open-minded, truthful, and analytical; in short, a willingness to engage in CT (Beyer, 1987; Ennis, 1987).

Perkins et al (1993) have developed a long elaborate list, which consists of nearly seventy dispositions that depend on seven main points which are:

1. To be broad and adventurous
2. Sustained toward intellectual curiosity
3. To clarify and seek understanding
4. To be plan and to be strategic
5. To be intellectually careful
6. To seek and evaluate reasons
7. To be meta-cognitive. (p.13)

Researchers tend to identify similar sets of dispositions as relevant to CT as possible for example: open-mindedness (Bailin et al., 1999; Ennis, 1985; Facione 1990, 2000; Halpern, 1998); fair-mindedness (Bailin et al., 1999; Facione, 1990); the propensity to seek reason (Bailin et al., 1999; Ennis, 1985; Paul, 1992); inquisitiveness (Bailin et al., 1999; Facione, 1990, 2000); the desire to be well-informed (Ennis, 1985; Facione, 1990); flexibility (Facione, 1990; Halpern, 1998); respect for, and willingness to entertain others' viewpoints (Facione, 1990; Bailin et al., 1999).

1.3.2. Component Processes

Component processes are a set of processes that a student should master including highly successful skills and abilities. According to Moon (2008) an effective critical person must have set of habits and attitudes towards everything and the ability to recognize different feelings and emotions. Butterworth and Thwaites (2013) claimed that the main stands a person should accomplish to think critically are:

- Interpretation, evaluation, explanation, analysis, inference, production of arguments.
- Seek alternatives and activate alertness.
- Self-Regulation, self- correction, self- direction.
- Draw conclusions and generalisations.
- Identify and evaluate assumptions.
- Making informed evaluative judgments about claims and arguments.
- Identify problems and select the appropriate method of solution.
- Being fair, open-minded, active, well informed, sceptical and independent. (p.03)

1.4. The Importance of Critical Thinking in Language Teaching

It is generally accepted that the main, yet insufficiently met, aim of learning is to enable students to think critically. The significance of developing students' CT "goes far beyond improving their level of cognition in which they will be able to achieve higher proficiency across all the domains that they study" (Butterworth & Thwaites, 2013, p.4).

Accordingly, Hader (2005) said that the incorporation of CT in EFL classroom is a must to increase students' self reflection and creativity, and making them able to manage their time, makes logical interpretations, and also being able to practice these skills to solve problems and make wise decisions with real life problems. Thinking critically boosts self-awareness and control. It also builds the sense of objectivity, open-mindedness and respects other's opinions with less emotional impacts. "If students are to function successfully in a highly technical society, then they must be equipped with lifelong learning and thinking skills necessary to acquire and process information in an ever-changing world." (Hader, 2005, p16)

Therefore, teaching CTS in ESL/EFL classes has become a must since they are considered as the 21st century skills that enable students to solve problems and perform effectively in complex situations and encourage them to demonstrate a deeper awareness of complexity in their thinking across all educational domains.

1.5. Critical Thinking Assessment

Matthews and Lally (2010) stated that the development of students' CT in education is a valuable result itself; applying those skills enable them to achieve higher proficiency of thinking across all the learning domains. Nevertheless, test and examination are inescapable need in the educational system. The main aim of assessment is to gather information about students 'performance or progress, but CT assessment is not any kind assessment whereby it seeks to test the cognitive skills instead of the knowledge of the subject matter.

Due to the difficulty of measuring individuals' CTS, countless CTS assessment tests were formed based on students' and teachers' educational needs. Watson-Glaser Critical Thinking Appraisal (WGCTA); one of the oldest and most widely-used tests in CT assessment, was designed to assess the ability of making inferences, logical assumptions and conclusions with

supported arguments (Watson & Glaser, 1980). Watson Glaser test is a total of 86 questions divided into five sections: Inferences, arguments, assumptions, deductions, and interpreting information. It is a valid and reliable appraisal applied as an important predictor of CTS in a variety of educational settings and job performances all around the world.

2. Visible Thinking

2.1. Definition of Visible Thinking

Recently, education is receiving increasing pressure to follow up the 21st century needs and its ongoing social situations. This involves changing the content used in schools from being basic, non-active to a curriculum that uses more a flexible way of teaching in which the students are expected to wrestle with the problems, to persist through uncertainty and to draw upon their own reasonable thinking.

Visible thinking is an approach developed by Ron Ritchhart in his research ‘*Developing Students Thinking Depositions*’ in 2002. This approach represents the best kind of techniques in teaching how to control and use both knowledge and tools to achieve the objectives of the study (Lebow, 1993). A number of researches proved that this approach can boost one’s personal autonomy, generatively, reflectivity, active engagement, personal relevance, and pluralism; overall it is where an individual or group collective thinking is valued, visible and where teachers strive to create in order to develop cultures of thinking in their classrooms (Ritchhart, 2002).

Tishman & Palmer (2005) said that “visible thinking is any kind of observable representation that documents and supports the development of an individual’s or group’s ongoing thoughts, questions, reasons, and reflections. Mind maps, charts and lists, diagrams, worksheets all count as visible thinking if—and this is an important if—they reveal learners’ unfolding ideas as they think through an issue, problem or top” (p.1). It is generally acknowledged that the majority of learners learn better when they are able to see, hear, observe,

analyze and hold on to any image or clip and connect it to a concept, a place, a person or to an already existing knowledge and on that base students explore and understand their own thinking and learning . This method uncovers their thinking for both the teacher and classmates and this method helps in correcting misconceptions, uncovering prior knowledge, evaluating reasoning abilities and degree of understanding.

Visible Thinking approach involves several practices and resources that serve the same goals which are: to deepen understanding of content, motivate learners for learning, develop learners' thinking and learning abilities, develop learners' attitudes toward thinking and learning and their alertness to opportunities for thinking and learning (the "dispositional" side of thinking), and shift classroom culture toward a community of enthusiastically engaged thinkers and learners (Ritchhart, 2002).

In assessing visible thinking, it is important to keep open connections between students under such learning environment, because when thinking is visible it is easier for the teacher to observe the way each and every student thinks and processes pictures and words because it varies in how one analyses it. This kind of activities are never considered as hard for teachers because they only work as monitors and facilitators and let the lesson takes places in testing the capability of students' thinking.

2.2. Making Thinking Visible: Supporting and Scaffolding Learning and Thinking

In order to make thinking visible, classrooms are dominated by routines that structure students' process of learning. Ritchhart (2015) believed that it is necessary for teachers to establish and create new patterns of behaviour in which they apply learning and thinking routines that serve to manage students' behaviour and interactions inside the classroom.

Ritchhart et al (2011) maintained that thinking routines are not just activities as they are vehicles to run and enrich the subject matter of any course. Teachers should know how to apply the appropriate routine or routines for the right content. Routines are like a bowl that should be filled with a substantial, valuable, and proper subject matter. Students' engagement when thinking routines are used, would be highly increased in which they would share their ideas, explanations, and interpretations, as they would be mentally prepared to activate their reflection, reasoning, and creative thinking. Using thinking routines would provoke revolutionary attitudes across learning and thinking and they would be the clue for making students open-minded, extravert, and curious about facts and thoughts.

Making thinking visible is a real challenge for both teachers and learners as they have to make a clear meaning about thinking. In this way students would be able to make thinking visible for themselves, their peers, and their teachers. Additionally, teachers must create opportunities for thinking via presenting content to be discussed, and then the big challenge will be raised: how can teachers put this into practice? (Ritchhart et al, 2011). The visibility of students' thinking rests upon three elements: questioning, listening and documenting (ibid).

2.2.1. Questioning

Ritchhart et al (2011) declared that adopting the Visible Thinking approach goes beyond testing students' memory of what he/she has studied. Thinking Routines use a set of questions that promote curiosity and engage for discovery. They provide a flexible framework for teachers to ask better questions and push students to reflect, analyse, interpret, and create ideas. Thinking Routines are systematically used by teachers with a consistent particular content to ask the right questions. Questioning is the most important element that teachers should focus on, in which they try to ask questions that:

- Pattern their interest in the ideas and information that have been discovered inside the classroom.

- Support and scaffold students' thinking and encourage them to explore knowledge and build comprehension by themselves.

- Guide students to an extent that they will be able to intellectually organise and construct understanding much better than before (ibid)

2.2.2. Listening

Ritchhart (2002) observed that many times when teachers ask the same questions students do not respond the same way they did before. Their answers seemed to be guessing rather than thinking and that made him decide to investigate more the situation. He noticed that the problem was not only with students, the main focus of teachers was what they were going to do or say next what impeded to listen to students. He concluded that although questioning is an undeniable factor in the teaching process, but also listening to students' answers is highly important. Listening conveys the message that the teacher is interested in hearing students' thoughts and ideas, and improves a respectful teacher-student interaction inside the classroom. Additionally, Brown (1994) stated that the only way teachers can ensure that students have comprehended what they have tackled in the classroom is through listening to their overt responses.

2.2.3. Documenting

Another tool for making thinking visible is documenting. Ritchhart et al (2011) defined documenting as the activity of collecting different various forms of documents and capturing the events, questions, conversations, and acts that provoke and improve the process of learning. It is important for both teachers and students to use this tool inside the classroom via:

- The use of sticky notes to record teachers instructions and students' answers and contributions.

- Students answer sheets and papers as tools to assess and provide feedback on students' work.

- Video and audio recordings of classroom discussion.

- Writing learning journals (ibid).

2.3. Visible Thinking Routines

VTR are simple and easy procedures that provide teachers with a framework and particular thinking schemes that foster students' understanding. Classrooms are controlled by such routines that are used repeatedly as a strategy to organise students' thoughts and behaviour in order to achieve higher proficiency and accomplish teaching and learning goals. A recent research by Ritchhart (2015) has shown that teachers who establish, adapt, and utilize VTR inside the classroom are more successful in advancing and scaffolding students' thinking. According to him, teachers must look at these routines from three perspectives:

- As tools: teachers should first identify the goals they want to accomplish, then choose the appropriate thinking routine to serve as a tool to achieve the identified goals.
- As structures: routines are made up of a series of steps that can simply be used as scaffolds in order to shape the way that students think.
- As patterns of behaviour: thinking routines help students to develop particular patterns of behaviour which develop automatically their own thinking.

Originally, these thinking routines have been classified into five key thinking routines: core, understanding, truth, fairness, and creativity. Then, for different reasons, Ritchhart and his

colleagues (2011) presented a new classification in order to make teachers' lesson planning more easier. Hence, they are classified into three major categories: Routines for introducing and exploring ideas, routines for synthesizing and organizing ideas, and routines for digging deeper into ideas.

2.3.1. Routines for Introducing and Exploring Ideas

2.3.1.1. See-Think-Wonder

According to Ritchhart et al (2011), this routine involves the following order:

Looking at an image or object:

What do you see?

What do you think?

What do you notice? (p.52)

This routine engages students to look very closely at an image, object or stimuli, and use this close observation as the base to obtain greater insights, form grounded interpretations, build evidence-based theories, and nurture curiosity (ibid). The steps involved in the routine are:

- Set up: Choose an image or an object that includes enough details to allow students for close observation.
- See: Ask students to spend time noticing and recording what they see.
- Think: make a logical interpretation about what is going on in the image/object.
- Wonder: ask students what they wonder about and push them to see beyond the image/object. (ibid, p.52)

After each step or at the end, students are asked to share their thinking and write down their ideas on a piece of paper or on sticky notes. At the same time, teachers are also asked to assess students' thinking and provide the appropriate feedback. Assessing students' thinking by teachers should be involved in every mentioned routine.

2.3.1.2. Zoom In

Like See-Think-Wonder, this routine requires students to look closely at an image or an object and make logical interpretations. The difference is that the teacher here reveals only parts of an image over time and asks students to explain. This routine involves the following steps:

- Look closely at the small bit of image that is revealed: What do you see or notice, what is your hypothesis or interpretation of what this might be based on what you are seeing?

- Reveal more of the image: What new things do you see, how does this change your hypothesis or interpretation, has the new information answered any of your wonders or changed your previous ideas, and what new things are you wondering about?

- Repeat the reveal and questioning until the whole image has been revealed: What lingering questions remain for you about this image? (ibid, p.61)

2.3.1.3 Think-Puzzle-Explore

This routine is the most widely used classroom routine, in which it stimulates students' prior knowledge, stimulates ideas and curiousness and sets the stage for deeper inquiry (ibid). Here, the teacher presents a topic, concept or theme in the classroom, then divides questioning into three phases:

- What do you think you know about this topic?

- What questions or puzzles do you have about this topic?
- How might you explore the puzzles we have around this topic? (ibid, p.68)

2.3.1.4. Chalk Talk

This routine is a conversation conducted silently on a piece of paper, in which every learners' voice is heard (ibid) .Chalk Talk is a valuable tool for making thinking visible that helps in making connections, considering different viewpoints and perspectives, and wondering and asking questions. The steps included in the routines are:

- What ideas come to mind when you consider this idea, question, or problem?
- What connections can you make to others' responses?
- What questions arise as you think about the ideas and consider the responses and comments of others? (ibid, p.75)

2.3.1.5. 321 Bridge

This routine uncovers students' prior knowledge, thought and understanding of a certain topic and link them to a new thinking received from teacher's instruction or lesson explanation (ibid). This process can go through the whole unit as it focuses on understanding one's thinking and bridging ideas rather than coming up with straight new concepts and this helps students to really understand themselves as learners and thinkers.

When developing new understanding, the teacher introduces this routine and asks students to write three thoughts, two questions and one metaphor from their own understanding about that topic then they get provoked or pushed in the direction of new understandings with videos, images or reading articles (ibid). Next, they would be asked again to repeat the process using

their new thinking. Thus, the name ‘bridge or “bridging” refers to the idea of connecting the already existed knowledge with the new ideas the students develop as the unit progresses along explaining what caused the shift and how it happened.

2.3.1.6. Explanation Game

Just like See-Think-Wonder routine, this one involves looking at an object or an image and try to decode the parts of it rather than the whole. Students here can work individually but it is preferable to work in pairs or groups to get better results because the explanations become more visible and all students can develop their ideas or be a part of the process.

In this routine, the shared object should be familiar to students but they do not truly understand how it works or when to use it. So, the routine proceeds as following: After being exposed to the object, the teacher asks students to name it and see what they have noticed about it like any observed features and aspects. In the next step, students are required to explain what made them say that and how they ended up with such conclusions using evidence and reasoning. The last step is more of exchanging arguments back and forth among students; whether they are supportive or critical to classmates’ point of view in order to end with a final clear conclusion.

2.3.2. Routines for Synthesizing and Organizing Ideas

2.3.2.1. The 4 C’s

For Ritchhart et al (2011), the 4 C’s routine is a classroom framework for discussing a text, video or a presentation. The learner is invited to read a text or listen to a speech, then, he/she tries to make connections, ask questions, identify key ideas, and consider application. The routine involves the following steps:

- Make connections: What connections do you draw between the text and your own life or your other learning?

- Raise challenges: What ideas, positions, or assumptions do you want to challenge or argue with in the text?

- Note concepts: What key concepts or ideas do you think are important and worth holding on to from the text?

- Identify changes: What changes in attitudes, thinking, or action are suggested by the text, either for you or others? (ibid, p.137)

2.3.2.2. Generate-Sort-Connect-Elaborate: Concept Maps

This activity helps students to structure the ideas together in a good and organized manner to get a meaningful concept, by activating their prior knowledge and encouraging the follow of ideas and the connection between them. The goal of this routine is to deepen individuals understanding and benefit from classmates thinking in developing the concept map (ibid).

This routine comes with more organized and easy steps where students first have to make a list of things they believe it is associated with the concept given by the teacher and then they are asked to sort the words or ideas depending on their importance to the content concept. Next, they have to connect the ideas of closer meanings and the last step is to elaborate what they have written of ideas and understandings.

2.3.2.3. The Micro Lab Protocol

Ritchhart et al (2011) stated that the Micro Lab Protocol routine is a simple structure for discussion or a topic or an issue. The aim of implementing such routine is to guarantee that all

ideas are presented and every voice is heard. Students are invited to reflect individually on a given topic or issue, then working in trio following these steps:

- Share: The first person in the group shares for an assigned time (usually 1–2 minutes). The other members listen carefully without comment or any interruption.

- Call for silence: pause for 20–30 seconds of silence to take in what was heard.

- Do rounds 2 and 3: repeat for persons two and three, pausing for a moment of silence after each round.

- Commence discussion: start an open discussion as a group for (5–10 minutes), recording the comments that have been discussed and making connections between what others have said or asking questions for clarification (ibid,p.145)

2.3.2.4. Connect-Extend-Challenge

At the middle or end of unit or a lesson, this routine works effectively in connecting between old existing understandings and the new concepts. It also helps them on moving forward, keeping the mind active by detecting difficulties, asking question and reflecting to any problem they face.

Before the start of this routine, the teacher asks students to pay more attention to the lesson, here they will be more aware of what is going to be presented; afterwards students try to connect the information they knew and new ones. With these changes, some students will identify that their knowledge extended and took a different way and some others might face challenges in accepting such puzzling information.

2.3.2.5. I Used to Think..., Now I Think

This reflective routine focuses on how students' understanding, primary thoughts, views, or beliefs are likely to be developed as a consequence of teaching instructions or experience. For instance, after reading a text, watching a movie, listening to a speech, having a new experience, having a discussion into the classroom, and so on (Ritchhart et., al, 2011). The following statement explains clearly the idea of this routine:

- Reflect on your current understanding of an issue or a topic, and respond to each of these sentences stems:
- I used to think...
- Now I think... (ibid, p. 153)

2.3.3. Routines for Digging Deeper into Ideas

2.3.3.1. What Makes You Say That?

According to Ritchhart et al (2011), this routine requires students to observe, describe and interpret what they see, read or hear. In follow-up answers, explanations, claims, or views expressed by students, “the teacher asks the following question: What makes you say that? In order to elaborate on the thinking that lies behind their responses. Using this routine students are asked to find solutions by themselves and push them to examine reasons and evidence for their assertions”. (ibid, p.161)

2.3.3.2. Circle of Viewpoints

Ritchhart et al (2011) developed the Circle of Viewpoints routine to help students recognize diverse perspectives involved in and around an issue, topic, or event. Here, the teacher introduces the source material and writes it on the board in a circle, then forms four steps to begin this process of exploration:

- Identify viewpoints: brainstorm a list of viewpoints about the topic.
- Select a viewpoint to explore: ask each student to select one of these viewpoints and prepare to speak about the topic from that perspective.
- Respond to the “I think...” prompt: ask students to take on the character of their viewpoint and act out their various perspectives.
- Respond to the “A question I have from this viewpoint...” prompt: ask students to think of a question they might have from their chosen viewpoint. (p.167)

2.3.3.3. Step Inside: Perceive, Know About, Care About

This routine according to Ritchhart et al (2011) engages students to embody a character, and imagine themselves inside that point of view. From this perspective they are going to be asked:

- “What can this person or thing see, observe, or notice?”
- “What might the person or thing know about, understand, or believe?”
- “What might the person or thing care about?”
- “What might this person or thing wonder about or question?”(ibid, p.175)

2.3.3.4. Red Light, Yellow Light

According to Ritchhart et al (2011), the Red Light, Yellow Light routine is developed by David Perkins in order to provoke students to be skeptical and ask questions and make them more active listeners and readers. Using this routine helps learners to think critically, know when they should stop (red light) and wonder, and know when they proceed with a little care and caution (yellow light). The steps in this routine are summarized as follows:

- What are the red lights here? That is, what things stop you in your tracks as a reader/listener/observer because you doubt their truth or accuracy?

- What are the yellow lights here? That is, what things slow you down a bit, give you pause, and make you wonder if they are true and accurate or not? (ibid, p.175).

2.3.3.5. Tug of Wars

This routine encourages students to reason carefully about the “pull” of various factors that are relevant to a dilemma of fairness, students are familiar with this game and it is the best representation in the side of motivation and to appreciate the complexity of situations that has two sides to show.

With identifying a particular dilemma and explaining it, the teacher asks students to what side they stand and why they choose this side of tug. Afterwards she/he divides them in small groups depending on what side they belong, together they connect their ideas and generate it to a whole complete understanding then they would discuss with the other side of the tug. The last step is sharing thinking because when this routine is over the thinking of students towards the dilemma will change so the teacher asks for what made them believe in that direction (Ritchhart,2015).

2.3.3.6. Claim-Support-Question

Harvard Graduate School of Education (2019) defined this routine as a routine for reasoning with evidence via asking students to make a claim about something, support it with evidence, and pushing them to ask questions about the validity of this claim. Claim-Support-Question routine is a tool for raising students' awareness to think critically by revealing and encouraging the process of reasoning. This routine involves the following steps:

- Make claims about a topic: Ask students, “What claims, explanations, or interpretations might you have already about this topic?”

- Identify support for each claim: Ask students, “Now that we have these claims to consider, what can we see, notice, know, or find that might give support to them?”

- Raise questions: Ask students, “Now that we have given some support for these claims, is there evidence on the other side? What questions do we need to raise about these claims in order to truly examine their credibility? What more might we need to examine or explain?” (Ritchhart et al., 2011, p. 190)

Conclusion

In this chapter, we have discussed the concept of CT and visible thinking as well as the different VTR. It introduced the characteristics and components of the ideal critical thinker, then identified the importance of CTS and the necessity of integrating them into the educational system and how they can be assessed. Moreover, the researchers introduced the art of making thinking visible and how it can be applied in the classroom as a tool to reinforce the learning process of teaching and learning. At the end of this chapter, we concluded by presenting a set of VTR with specific tips on how to include them in the teaching contexts.

Chapter Two

Methodology, Results and Discussion

Introduction

This chapter sheds the light on the methodology undertaken in this research. It describes where the study is conducted and gives information about the participants. It also introduces the research design, research instruments, and procedures. Afterwards, the chapter addresses the data analysis, in which the obtained scores from the pretest and posttest are quantitatively analyzed along with the questionnaire results. The last part of the chapter is devoted to the discussion of the research findings in relation to the research questions and hypotheses.

2.1. The Research Location

The present study took place at the department of English in Chadli Bendjedid University, El-Tarf. The department of English is found at the Faculty of Letters and Foreign Languages. It was established from 2006 till 2009. During this period of time, it is used to be part of the Faculty of Human and Social Sciences. However, in 2010, there was a division between the Faculty of Human and Social Sciences and the Faculty of Letters and Foreign Languages. The Faculty of Letters and Foreign Languages is comprised of three departments, namely the departments of English, French and Arabic.

2.2. Participants

The participants of this study are second- year EFL students at Chadli Bendjedid University, enrolled during the academic year 2019/2020. Thirty Students from two groups were randomly chosen. They were twenty females and ten males with a varied proficiency level. They were aged between 21 to 35 years old. They were Baccalaureate holders from different streams: Natural Sciences, Humanities, Letters and Philosophy, and Foreign Languages. As they have

attended government schools, participants shared approximately the same educational background. Each student had completed seven years of English study prior to entering university, including four years in the middle school, three years in the secondary school and then, two years at the university specializing in studying English as a foreign language.

2.3. Research Instruments

To ensure that the experiment is conducted under proper circumstances and the collected data are valid, a set of instruments were carefully chosen to achieve accurate and reliable results.

2.3.1. Pretest and Posttest

The Watson-Glaser Critical Thinking Appraisal (WGCTA) is one of the most used tool for critical thinking assessment and measurement (McMillan, 1987; Spicer& Hanks, 1995; Watson & Glaser, 1980). It has been applied for a variety of occasions on different population groups, but it is often used to assess the cognitive abilities of professionals. It is seen as a developmental tool in educational settings, in addition to being used to select good managers and finding possible future leaders. It is also used in order to select the right person for a specific job role. As stated by Watson and Glaser (2010) that the assessments of their test are “designed to measure important abilities and skills involved in critical thinking. It has been used in organizations as a selection and development tool and in academic settings as a measure of gains in critical thinking resulting from specific coursework or instructional programs” (p. 1). The WGCTA has undergone many modifications and different versions have been formed with more advanced options like the Watson-Glaser II Critical Appraisal and the Watson-Glaser Critical Thinking Appraisal Form Short (WGCTA-FS) (Watson & Glaser, 1994).

In order to measure the students’ cognitive skills, this test (Appendix A) was designed as an effective instrument to measure second year EFL students’ CT abilities at Chadli Bendjedid University. The Watson Glaser test used in this study consists of around 30 questions split into

five sections which are: 1) Assessment of Inferences, 2) Recognition of Assumptions, 3) Deduction, 4) Interpretation, and 5) Evaluation. These questions follow a multiple choice format with 30 minutes to complete the test.

2.3.2 Students' Questionnaire

The students' questionnaire (Appendix B) consists of two sections. The first section includes two questions concerning the participants' background information. The second section presents a number of statements in which the students are asked to what extent they agree with each statement. This section aims to get general insights about the participants' perceptions towards VTR used in the treatment and to answer the second research question.

2.4. Research Design and Procedures

The current study is a quantitative quasi-experimental research, following the one-group pretest-posttest design, which includes a pretest followed by a treatment, posttest and a questionnaire for a single group (Creswell, 2003). The experiment stretched from February, 2020 to the first week of March, 2020. It comprises a pretest to determine the students' CT level, treatment of four sessions, once per week, and a posttest to see to what extent the treatment was effective as far as their thinking skills are concerned, followed by a questionnaire whose aim is to know how the treatment affected them.

2.4.1. Pretest

During the first meeting with the participants, the students sat for a pretest designed to test their CT level and were required to read carefully the statements and the instructions preceding each section then color the most appropriate answer in the answer sheet (see Appendix A). After explaining the test and its aims, students have individually completed the test for 30 minutes.

2.4.2. Treatment

This step of the experiment came right after the pretest. The sessions held once a week with 30 students following regular lessons of linguistics module curriculum with a little bit of twist concerning the teaching methods used in the couple past years.

The first two workshop sessions were about “case grammar”. The routines used in the first session were **see-think-wonder** (Appendix C) and **321 bridge** (Appendix D). At the beginning of the lesson, we asked the students about their initial thoughts and background knowledge about the subject written in the blackboard. Few of them responded that it is another theory of linguistics but most of them remained passive. Then, we have introduced the next routine right away. We have asked the participants to give us three words they have in mind about this topic without over-thinking. Their answers were written on the blackboard. The most common words identified by students were: grammar, nouns, verbs, syntax, Chomsky, structuralism, parts of speech. It seems that the participants did not have any background knowledge about this theory. Next, they were asked to think of two questions related to the topic. The majority of them have proposed these questions:

- What is case grammar?
- Who did develop case grammar?
- When it was developed?

As a final step in 321 bridge routine, the participants were asked to think of an analogy to describe this topic using examples. All of them remained silent and could not think of any analogy. We required them to write their initial answers on a piece of paper.

Next, we started explaining this theory using examples to illustrate more the idea that stands behind the main subject leaving them the space to figure out the aspects of each example.

With little instructions from their teacher, the students managed to decode the phrases and what ‘case grammar’ is about. In each example, they have been asked to guess the function of different grammatical categories. At the end of the session, they were asked the same questions to get their final responses and identify the bridge that connects their initial answers to their new ones. This time, they have given different responses and the three words that have been suggested by them were: Fillmore, grammatical function, case of pronouns, role of grammatical categories, deep structure, agentive case, objective case, and dative case. It seems now that the participants have more ideas about the topic. Additionally, the two questions proposed by them were:

- What is the relation between case grammar and other types of grammar?
- What is lacking in this theory?

For the analogy or a similar idea to case grammar, most of them have suggested the following ideas: ‘functional grammar’, ‘syntactic analysis of words on deep level’, ‘‘grammatical analysis of the relation between parts of the sentence’ and ‘case grammar is the relation between nouns with other words in the sentence’. The participants were required to read and do more research about ‘case grammar’ for the next session.

The second session tackled the same subject and this time to test their acquired knowledge in the last session using the **connect-extend-challenge** routine (Appendix E), taking into consideration the research they have done about the topic and last session’s notes. So, they were given a set of sentences and were asked to apply what they have learned to solve the exercise questions. After solving the exercise and dealing with every feature of case grammar theory, we have asked them if they recognize any changes in their thinking and the challenges they have faced and probably still face in their learning experience, then, write them in a paper and share it with the whole class to make their thinking more visible. Progress has been shown through their writings as most of their responses showed a deep understanding and thinking and this is even

reflected in their way of putting words together as they have said that case grammar at first was nothing but ambiguous concept knowing only that it was a reaction to the standard-theory but now from what they wrote that case grammar works on describing the meaningful relationship between parts of the sentences and their functional roles.

The third session dealt with the theory of ‘functionalism’, which was developed as a response to generative grammar and structuralism. After watching the prompt given as a part of **the micro lab protocol routine** (Appendix F), which is a video explaining the theory in brief, we formed students in groups of five and made them write a conclusion of what they have understood. After 10 minutes, each group read aloud what they have written and the other groups gave their opinions about what they have heard. After a thorough group discussion, the participants were asked at the final 15 minutes to summarize what they have learned using **I used to think now I think routine** (Appendix G) to clear their thoughts about the lesson topic. Their papers, then, were collected to be corrected for the next session.

The fourth workshop, we returned the papers to the participants but we distributed them randomly. We had them reading each other’s papers and this time they sat in a full circle, following **the circle of viewpoints routine** (Appendix H). Then, we selected a paper which was full of errors regarding the ideas expressed and writing performance. Next, students have expressed their views about what is right or wrong from the perspective of a skillful writer. Few more papers were dealt with just to point out and put more practice on different perspectives.

2.4.3. The posttest

After completing the treatment, the posttest was administered online to the participants in order to measure to what extent the treatment was effective. Similar to the pretest, the needed instructions were explained to each student to pass the posttest, applying what has been learnt in the treatment. To make sure that the assessment procedure is reliable and valid, each one of the

pretest and posttest papers was carefully examined and assessed twice by the researchers. Then, the given scores were compared, and the ones agreed upon were chosen. In case of a difference between the given scores of the same paper, a third review and discussion took place, settling the final results with agreement.

2.5. Data Analysis

2.5.1. The Pretest

To answer the research questions, pretests were scored anonymously and independently by the researchers and compared for the sake of sufficiency. Each correct question answer had one point (+1) and minus one (-1) for the incorrect one. The test scores can range from (-30), which is considered very low for university students, to (+30), which is a hard score to achieve even for the best critical thinker. The researchers selected the score (+10) as the average. Data retrieved from the test were analyzed according to the overall scores of the test, then according to each section.

2.5.1.1. The Pretest Overall Scores

In order to see scores distribution among second year EFL students, data were analyzed according to the overall scores which is demonstrated in Table

Table

The Pretest Overall Scores

Pretest Score	-30...-20	-18...-10	-8...0	2...10	12...20	22...30
Student Number	0	5	20	5	0	0
Percentage	0%	16,66%	66,66%	16,66%	0%	0%

Table 2.1. The Pretest Overall Scores

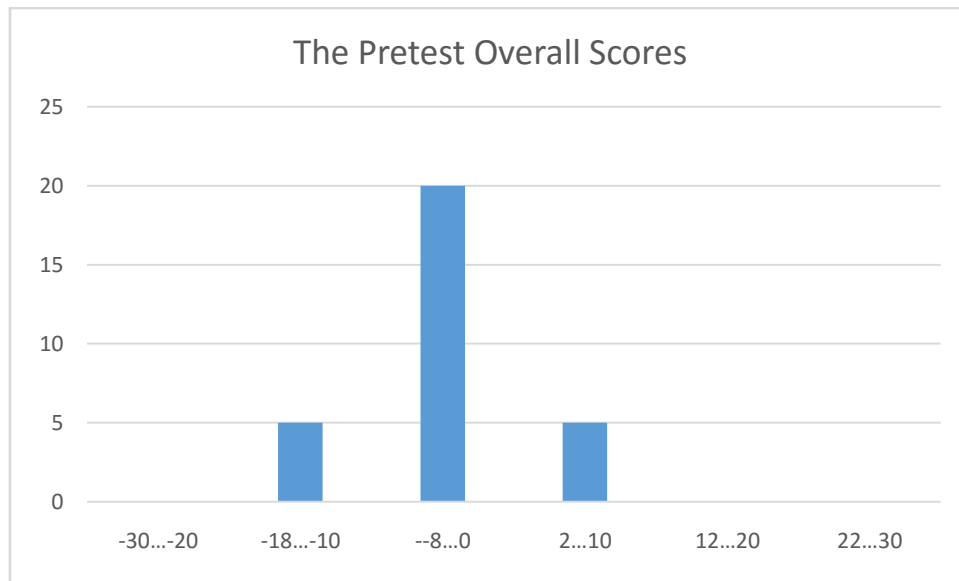


Figure 2.1. The Pretest Overall Scores.

The statistical data displayed in Table demonstrate the CT skills' scores of Second year EFL students (N=30) obtained from the W-GCTA Pretest. Five participants (16, 66%) received a score of (-18 to -10), while (66,66%) of participants received a score of (-8 to 0). And only five students (16, 66%) obtained an overall score of (-8 to 0).The highest score should be (+30), but none of them got this score. In addition, all participants (100%) did not even reach the average (+10).

2.5.1.2. The Pretest Scores According to Each Section

Score	-6	-4	-2	0	2	4	6
Inference	5	15	5	4	1	0	0
Percentage	16,66%	50%	16,66%	13,33%	3,33%	0%	0%
Recognition of Assumptions	2	2	8	10	6	2	0
Percentage	6,66%	6,66%	26,66%	33,33%	20%	6,66%	0%
Deduction	1	5	9	4	6	4	1
Percentage	3,33%	13,33%	30%	13,33%	20%	13,33%	3,33%
Interpretation	2	6	7	9	5	1	0

Percentage	6,66%	20%	23,33%	30%	13,33%	3,33%	0%
Evaluation of Arguments	0	3	1	14	7	5	0
Percentage	0%	10%	3,33%	46,66%	23,33%	13,33%	0%

Table 2.2. The Pretest Scores According to Each Section.

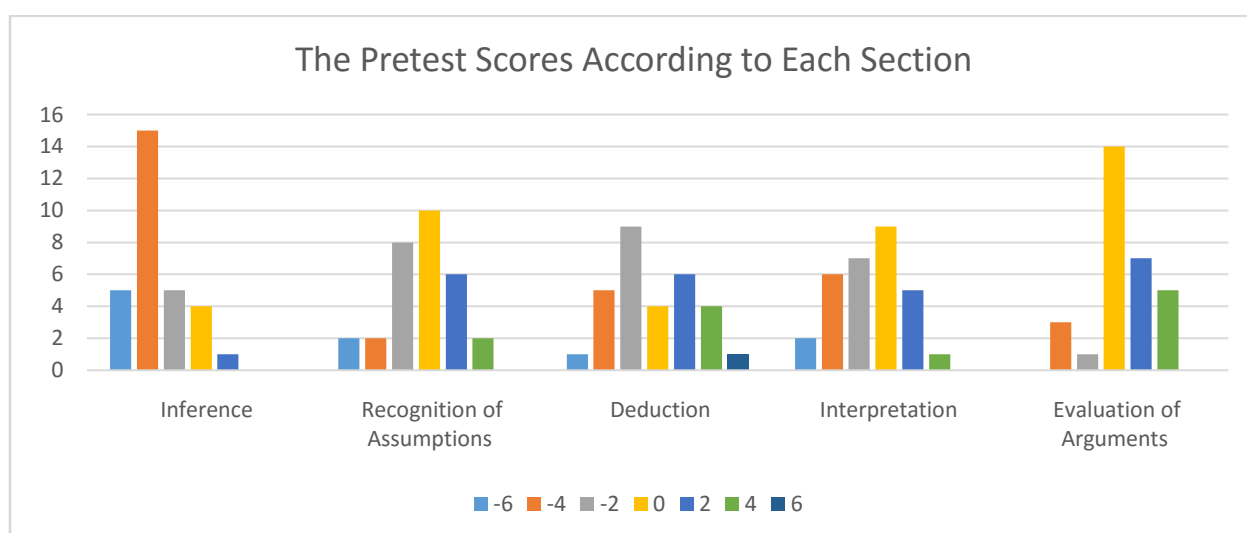


Figure 2.2. The Pretest Scores According to Each Section.

For the sake of discovering what CT abilities EFL Algerian students have, the W-GCTA was analyzed according to the skills in each section. The results show that the scores of each section is different from the other one, in which students showed better scores in responding to the sections of deduction and evaluation of arguments. Moreover, the scores obtained from other sections are also very low. The scores displayed in Table show that the majority of students scores were ranging between (-4), (-2), and (0), while few of them had (+2 and +4) and only one student had the full score in one section.

2.5.2. The Posttest

The posttests were set online using Google forms survey and they were also assessed and given scores using the same method of assessment used in the pretest. Data retrieved from the

posttest were analyzed according to the overall scores, then according to each section. Thus, means and standard deviations were calculated, Paired-Samples T Test was utilized to see any significant statistical difference between students' pretest and posttest scores. The SPSS Win program was used in comparing means, calculating the data and building graphs.

2.5.2.1. The Posttest Overall Scores

The statistical data obtained from the posttest among participants were analyzed according to the overall scores as illustrated in Table

Pretest Score	-30...-20	-18...-10	-8...0	2...10	12...20	22...30
Student Number	0	3	16	11	1	0
Percentage	0%	10%	53,33%	36,66%	3,33%	0%

Table 2.3. The Posttest Overall Scores.

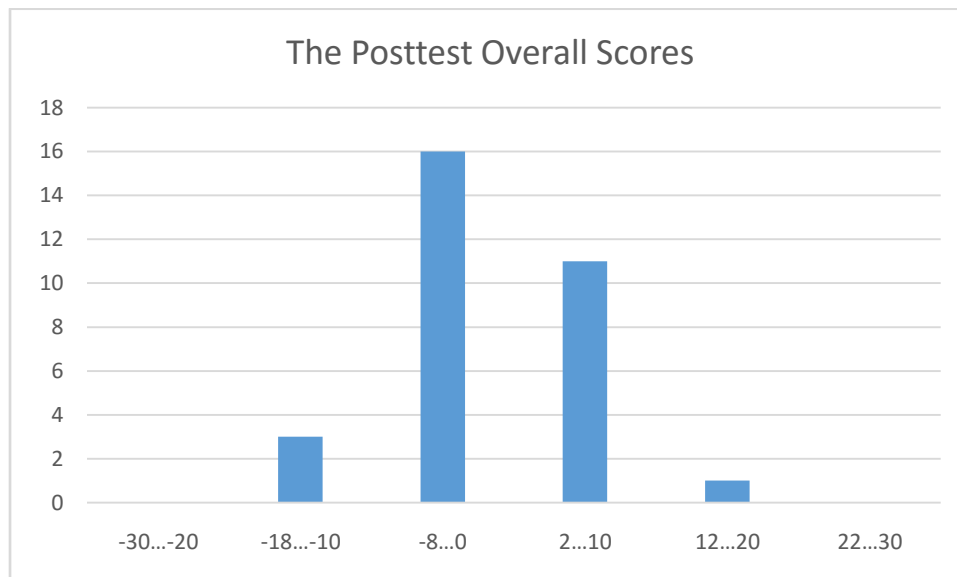


Figure 2.3. The Posttest Overall Scores.

The posttest data show that three students (10%) got a score of (-18 to -10). Sixteen participants received a score of (-8 to 0), while eleven students referring to (36, 66%) earned a score of (-8 to 0). And only one student (3, 33%) obtained a score of 12 which is the highest score received. In the posttest, three students managed to reach the average (+10) and the scores have shifted to better results.

2.5.2.2. The Posttest Scores According to Each Section

Score	-6	-4	-2	0	2	4	6
Inference	1	11	10	6	2	0	0
Percentage	3,33%	36,66%	33,33%	20%	6,66%	0%	0%
Recognition of Assumptions	1	0	8	13	7	1	0
Percentage	3,33%	0%	26,66%	43,33%	23,33%	3,33%	0%
Deduction	2	1	4	10	11	2	0
Percentage	6,66%	3,33%	13,33%	33,33%	36,66%	6,66%	0%
Interpretation	0	1	8	7	9	5	0
Percentage	0%	3,33%	26,66%	23,33%	30%	13,33%	0%
Evaluation of Arguments	0	1	1	11	11	5	1
Percentage	0%	3,33%	3,33%	36,66%	36,66%	13,33%	3,33%

Table 2.4. The Posttest Scores According to Each Section.

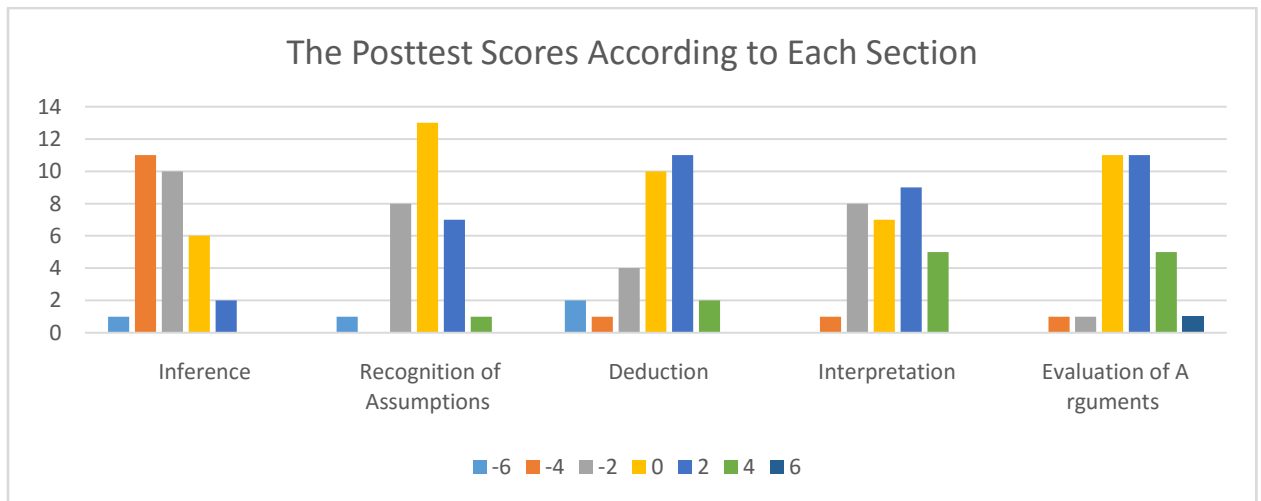


Figure 2.4. The Posttest Scores According to Each Section.

The results displayed in Table show that the scores have drastically changed, especially in the evaluation of arguments, interpretation and deduction sections. The majority of scores were ranging from (-2) to (4) and this confirms that the scores have increased after the treatment.

2.5.3. Comparison between Pretest and Posttest Means

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	-4.3333	30	6.03629	1.10207
	Posttest	-0.4000	30	6.61034	1.20688

Table 2.5. Paired Samples Statistics.

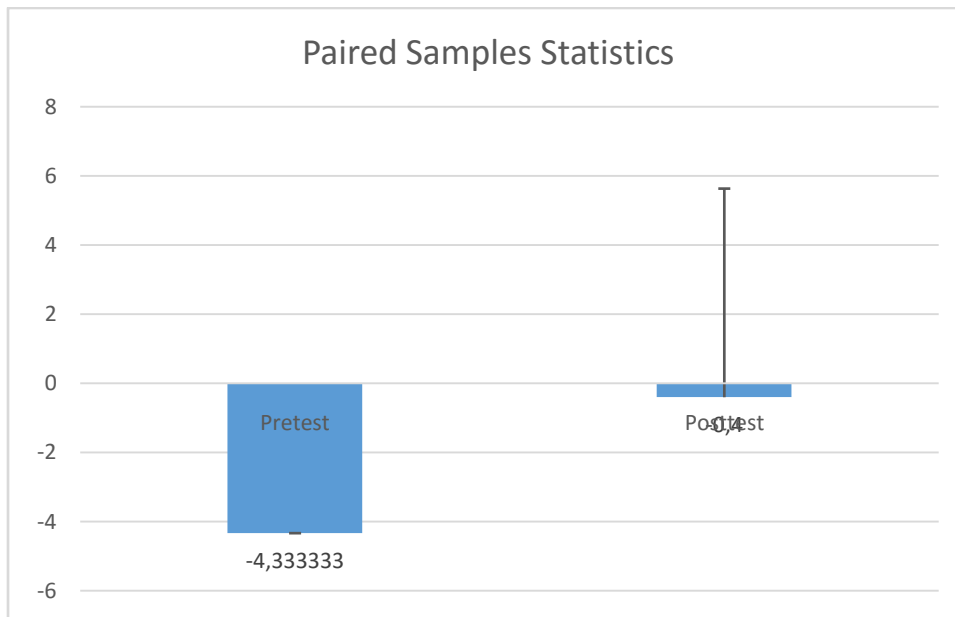


Figure 2.5. Paired Samples Statistics.

The statistical results analyzed by Paired-Samples T Test showed that the mean scores of the pretest are statistically different from the means of the posttest. In the pretest, students lacked the fundamental CTS as most of them failed at least to reach the average. In the posttest, even though the results were not satisfying but they performed better compared to the pretest. The posttest data showed that there was a significant improvement in the students' overall scores. The overall mean increased from (-4.3333) to (-0.4000) with a change of (+3.9333).

2.5.3. Students' Questionnaire Analysis

Section One. Background Information

Table 2.6

The Participants' Background Information

Gender	Male					Female
N	9					21
P	30%					70%
Age	19	20	21	22	23	32
N	21	6	2	0	0	1
P	70%	20%	6,66%	0%	0%	3,33%

The data in table 2.6 show that the male participants are 9 (30%), while the female participants are 21 (70%). The majority of students 70% (N=21) are 19 years old, six students (20%) are 20 years old, two students (6,66%) are 21 years old and only one student (3,33%) is 32 years old.

Section Two: Students' Reflections towards Visible Thinking Routines

Table 2.7

The Participants' Reflections towards Visible Thinking Routines

	Agree		Neither agree nor disagree		Disagree	
	N	P	N	P	N	P
Statement 1	30	100%	0	0%	0	0%
Statement 2	29	96,66%	1	3,33%	0	0%
Statement 3	30	100%	0	0%	0	0%
Statement 4	27	90%	1	3,33%	2	6,66%

Statement 5	29	96,66%	0	0%	1	3,33%
Statement 6	28	93,33%	2	6,66%	0	0%
Statement 7	29	96,66%	0	0%	1	3,33%
Statement 8	30	100%	0	0%	0	0%
Statement 9	30	100%	0	0%	0	0%

The answers of the first statement indicate that all students (100%) have recognized a change in their learning experience after applying the routines in the treatment. Additionally, in the second statement, 29 of students (96,66%) declared that their thinking and cognitive skills have changed after dealing with these routines in the lesson and only one student has chosen to be neutral. In the third statement, all students agreed that VTR helped them to think critically better than the old methods of teaching. In the statement number four, 27 of students (90%) admitted that the routines were very interesting and engaging with the disagreement of two students (6,66%) and only one student (3,33%) answered with neither agreed nor disagreed. The statement five has shown that the majority of students (N=29) have enjoyed the routines applied in the treatment and only one student (3,33%) did not think the same. 28 of students (93,33%), in the statement number six, have agreed that the identified goals of the lesson have been achieved and two students (6,66%) have chosen to be neutral. Statement 7 has shown that 29 of students (96,66%) agreed that the routines helped them solve and overcome learning struggles and pitfalls and only one student (3,33%) has denied that. All students (100%) indicated, in the statements number 8 and 9 that they fully support the idea of integrating VTR in the educational system and EFL teachers should adopt these routines in the classroom since boost their thinking skills.

2.6. Discussion of the Findings

The statistical results of the study proved that the treatment was an effective tool in improving students' CTS. This improvement was clearly apparent in the W-GCTA posttest results and the increase in the mean of students' overall scores. In addition, the student have positively reflected on the treatment as shown in their answers to the questions of the questionnaire. Although, they have a low level of CT abilities since the majority of scores were all below the average (+10), but they have shown that they are ready to develop their thinking based on the results of both tests.

Analyzing the W-GCTA pre and posttest according to each section showed that students are not able to define problems, recognize stated assumptions, formulate and select relevant and promising hypotheses, draw valid conclusions and judge the validity of inferences. Even after the treatment, students still lack the basic skills and abilities to think critically. They still also require more attention from their teacher as a thinking booster not just as an information provider. The researchers applied a set of VTR in the treatment and new techniques and activities were used to reinforce and push learners to think in a creative way. Making learners' thinking visible was a new and challenging approach to attract learners' attention and engage them to actively participate in the treatment.

Based on the findings extracted from the W-GCTA, it can be concluded that the first hypothesis which states that "VTR would improve and reinforce EFL students' CTS and understanding of different arguments and facts" is confirmed. Likewise, the data obtained from the students' questionnaire also provides a clear answer to the second research question and confirm the second hypothesis which states that "the Students would have positive perceptions and reflections regarding the effectiveness of VTR in enhancing their thinking skills".

Conclusion

This chapter presented the methodology adopted by the researchers while conducting the study. It offered information about the sample, the research location, the experiment, and the nature of W-GCTA pretest/posttest. It also introduced the VTR used in the treatment as well as the research design and procedures. Moreover, it dealt with the analysis and interpretation of the obtained data from both tests and from students' questionnaire. The findings revealed that the treatment was effective in developing the participants' CT level. Finally, the chapter discussed the study findings.

Chapter Three

Implications and Recommendations

Introduction

This chapter revolves around the pedagogical implications and recommendations derived from the research findings. It offers a set of suggestions to increase students' awareness to think critically and provide new strategies for teachers in order to level up students' thinking. It also brings solutions for the educational system in Algeria and suggestions for further studies.

3.1. Implications

Incorporating CTS in the educational system using VTR as a vehicle to run the classroom is the key to improve the process of teaching and learning and creating a place where thinking is valued, visible, and actively promoted. Teachers should support and scaffold students' learning and thinking by making thinking visible through the development of questioning techniques which promote curiosity and discovery. They should ask students to observe, make interpretations, make connections, and build on ideas.

3.2. Recommendations and Suggestions

3.2.1. For Students

In the present study, the students failed to provide perfect responses or reflections especially in the pretest because they lacked the skills that evaluate their CTS such as giving constructive comments and discussions and to be a critical thinker you have to go through the following six phases proposed by Dewey (1933) in order to be able to assess or deal with every problem one faces:

1. An experience
2. Spontaneous interpretation of the experience
3. Naming the problem(s) or the questions(s) that arises out of the experience
4. Generating possible explanations for the problem(s) or question(s) posed
5. Ramifying the explanation into full-blown hypothesis
6. Experimenting or testing the selected hypothesis

Dewey (ibid) believed that the attitude built toward an act could open a way to learning or block it and so the awareness and caution devoted to question what we wish is true or what we fear is true that is brought to class or even to the outside world is essential for an individual to work on being a good critical thinker.

3.2.2. For Teachers

● Adopting the learner-centered approach

Beyond sit and get method, teachers should let the students to take control of their learning. Following this approach, the teacher plays the role of a monitor, guider and a facilitator of the learning process. The main purpose is trying to engage the students to brainstorm their prior knowledge, then interpret, analyze, question and evaluate the new course materials in order to create new ideas, solve problems, and develop their thinking and learning. Critical thinking teaching goes beyond memorization and storing knowledge, in which the teacher is no longer an information provider. Students should activate their thinking and explore the knowledge themselves in order to feel confident that they have the skills and abilities to direct their learning as competent learners.

● Organizing visible thinking workshops relying on technological devices

Establishing VTR in the classroom has shown a huge success in managing the learning process as they help learning run smoothly and actively. VTR will work better if the teacher uses

workshops relying on technological devices to run thinking pictures, records, videos and maps inside the classroom. These workshops give learners the access to follow the course closely, in which everyone is involved to participate and interact with the teacher in a confident way. This digital exchange of the course assignments between the teacher and the learner would provide a smooth feedback and assessment process and create a comfortable atmosphere for more effective learning.

● **Using Bloom’s Taxonomy and questioning circles to develop more complex thinking questions**

Ron Ritchhart (2015) believed that questioning shapes teaching classrooms and questions are the primary tools that teachers use to interact with learners. Asking good questions can effectively advance learning and evoke deep thinking. Teachers can use Bloom’s taxonomy in their teaching as a reference for asking students questions, testing their level of thinking and thereby improving it. Christen Bury and Kelly (1983) stated that the Questioning Circles Model is made up of three circles that express three different aspects of cognition: the matter, personal reality and external reality. “The matter circle introduces the studied subject; personal reality is the students’ experiences, views and prior knowledge about this subject; external reality, which is described as “the world”, is about students’ “experiences, history and cultures related to the studied matter”.(as cited in Ati, 2019, p. 20).

3.2.3. For Educational System

The pedagogical suggestions would be directed for syllabus designers and material developers in the educational ministry to prepare a program to improve the quality of school education here in Algeria since learners are not educated as critical thinkers in their language educational system because teachers base their methods on traditional teaching framework. There are more teaching tools that have been introduced through time that can achieve optimal learning,

like VTR that evoke students to have nothing but intellectual, moral and emotional growth as Dewey argued (1916-1940.p 99) that a needed brand of education is the one which gives a person the interest in social relationships and control, and habits of mind that secures social changes without introducing disorders.

3.2.4. Recommendations for Further Studies

The field of education is too complicated that the researchers could not deal with the different aspects of CTS in one single work. Therefore, the researchers have suggested the following recommendations for future researchers:

- Creating a culture of thinking by fostering the intellectual character at Chadli Bendjedid University.
- Teaching grammar creatively using the Visible Thinking approach.
- The use of artful visual stimuli and the Visible Thinking approach in enhancing creative thinking in EFL classroom.

Conclusion

This chapter introduced pedagogical implications and recommendations drawn from the research's findings. The results showed that the majority of students need more support to raise their awareness to think critically and deeply analyze the information they get. Hence, a set of VTR have been introduced in order to improve the quality of thinking and learning. The researchers presented a list of suggestions and recommendations for students, teachers, the educational system, and for further studies in order to incorporate the Visible Thinking program as a vehicle to enhance students' CTS and foster the process of teaching and learning.

General Conclusion

Thinking skills are undeniably essential for dealing with the demands of the modern society which are very complex and more competitive. The results of our study clarifies the importance of making students' thinking visible through the implementation of VTR in classrooms as these activities facilitate students' on-going inquiry and enhance broader-deeper understanding. When the importance of thinking is put under consideration of teachers and students, they will definitely realize that they should keep an eye on what is beneath the surface by questioning, reading, and seeking information.

The tools shared along the experiment give the students the opportunity to connect with what they learn, developing their CTS through various situations and settings as it is explained earlier. Students' responses to such activities reflected their academic level, giving use a hint on how to guide and lead them to be ideal critical thinkers.

The results of this research have shown that the visible thinking program is a successful tool in enhancing students' CTS. Thus, the researchers have introduced a set of suggestions and recommendations to provide a better teaching and learning in order to reinforce the educational program. We have also given some suggestions for further research in order to explore and get wider knowledge related to this issue.

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Appendix A

Critical Thinking Test

Instructions:

This practice is adapted from Watson Glaser Critical Thinking test, will assess your ability to make inferences and logical assumptions and to reason with supported arguments. The test is comprised of the following five sections:

1. Inferences.
2. Assumptions.
3. Deductions.
4. Interpreting Information.
5. Evaluation of Arguments.

Read the instructions preceding each section and answer the questions.

Section 1: Inferences

Instructions: An inference is a conclusion drawn from observed or supposed facts. For example, if someone presses a light switch but the light does not turn on, they might infer that the filament has burnt out. However, inferences may or may not be correct. For each inference, you will be provided with 5 possible answers: True, Probably True, More Information Required, Probably False, and False. Select: True, if you believe the inference is definitely true, i.e. it correctly follows beyond a reasonable doubt. Probably true, if, based on the facts at hand, you think the inference is probably true; that it is more likely to be true than false, but not true beyond

a reasonable doubt. More Information required, if you decide that there is not enough data to make a decision based on the provided facts (or lack of facts). Probably False, if, based on the facts presented, you think the inference is probably false; i.e. it is more likely to be false than true, but there is not enough evidence to suggest that it is definitely false. False, if you think the inference is definitely false; i.e. it must be incorrect because it misrepresents the facts provided or contradicts the facts provided in the statement.

Statement 1

Two hundred students in their early teens voluntarily attended a recent weekend student conference in a city in England. At this conference, the topics of race equality and means of achieving lasting world peace were discussed, since these were the problems the students selected as being most vital in today's world.

Proposed Inferences

1. As a group, the students who attended this conference showed a keener interest in broad social problems than do most other people in their early teens

- True
- Probably true
- Insufficient data
- Probably false
- False

2. The majority of the students had not previously discussed the conference topics in their schools

- True
- Probably true
- Insufficient data
- Probably false
- False

Statement 2

Following a reduction in the number of applicants, the college has been asking students to evaluate faculty teaching performance for the last two years. The college's management announced that the purpose of these evaluations is to give information to faculty about teachers' strengths and weaknesses, and to allow those who make decisions about pay raises and promotions to reward the better teachers. Last week, Professor Burke, a recently retired senior lecturer at the college, wrote a letter in which he objected to these evaluations, claiming they compromise academic standards.

Proposed Inferences

1. There is more to the management's announced intentions than those mentioned by them in the passage.

- True
- Probably true
- Insufficient data
- Probably false
- False

2. There have been cases in which college staff deliberately lowered their standards in order to win over student favor on these evaluations.

- true
- Probably true
- Insufficient data
- Probably false
- False

Statement 3

Studies have shown that there is relatively much more heart disease among people living in the north of England than people living in the south of England. There is little if any difference, however, in rate of heart disease between northerners and southerners who have the same level of income. The average income of southerners in England is considerably higher than the average income of northerners.

Proposed Inferences

1. Whether northerners have high incomes or low incomes makes no difference to the likelihood of their developing heart disease.

- true
- Probably true
- Insufficient data
- Probably false

- False

2. The easiest way to eliminate heart disease in England would be to raise the general standard of living.

- true
- Probably true
- Insufficient data
- Probably false
- False

Section 2: Assumptions

Instructions: An assumption is something which is presumed or taken for granted. When a person says, “I will see you tomorrow”, it is taken for granted that they will be around tomorrow, and that they will not have last-minute plans which prevent them from seeing you tomorrow. In this section, you will be provided with a number of statements. Each statement will be followed by a series of proposed assumptions. You must decide which assumptions are logically justified based on the evidence in the statement. If you think that the assumption is taken for granted in the statement, and is therefore logically justified, select Assumption made. If you think that the assumption is not taken for granted in the statement, and is not therefore logically justified, select Assumption not made. Remember to judge each question individually and base your responses on the statements provided.

Statement 1

We need to save time in getting there so we'd better go by plane.

Proposed Assumptions

1. There is a plane service available to us for at least part of the distance to the destination.

- Assumption made
- Assumption not made

2. Travel by plane is more convenient than travel by train.

- Assumption made
- Assumption not made

Statement 2

Doctors say that who wishes to prevent kidney stones should drink three glasses of freshly squeezed orange juice a day.

Proposed Assumptions

1. Oranges are available throughout the year.

- Assumption made
- Assumption not made

2. A daily glass of orange juice may help prevent kidney stones better than other juices

- Assumption made
- Assumption not made

Statement 3

The proper aim of education in a free society is to prepare the individual to make wise decisions.

Proposed Assumptions

1. People who have been educated in a free society will not make unwise decisions
 - Assumption made
 - Assumption not made

2. Some kinds of education can help individuals make wise decisions
 - a. Assumption made
 - b. Assumption not made

Section 3: Deduction

Instructions: In this section, a statement will be provided followed by a series of suggested conclusions. Here, you must take the statement to be true. After reading each conclusion underneath the statement, you must decide whether you think it follows from the statement provided. If you agree that the conclusion exactly follows the statement, choose 'conclusion follows'. However, if you do not agree that the conclusions exactly follows then choose Conclusion does not follow. You must select your answer based only on the information presented; not using general knowledge. Similarly, you are advised not to let your own opinions or prejudices influence your decisions; stick to the statements and base your judgments on the facts presented.

Statement 1

No responsible leader can avoid making difficult decisions. Some responsible leaders dislike making difficult decisions.

Proposed Conclusions

1. Irresponsible leaders avoid things they dislike.

- Conclusion follows
- Conclusion not follow

2. Some responsible leaders do things they dislike doing.

- Conclusion follows
- Conclusion not follow

Statement 2

Some citizens pay taxes. Many citizens receive income support.

Proposed Conclusions

1. People who pay taxes do not receive income support

- Conclusion follows
- Conclusion not follow

2. The majority has income support

- Conclusion follows
- Conclusion not follows

Statement 3

Some Sundays are rainy. All rainy days are boring.

Proposed Conclusions

1. Some sundays are boring

- Conclusion follows
- Conclusion not follow

2. No clear days are boring

- Conclusion follows
- Conclusion not follow

Section 3: Interpretations

Instructions: The following questions will consist of a passage of information, followed by a series of conclusions. You are instructed to assume all information in the passage is true. The task is to judge whether or not each of the proposed conclusions logically flows beyond a reasonable doubt from the information given in the paragraph. If you think that a conclusion follows beyond a reasonable doubt (but perhaps not exactly, or necessarily, unlike in the Deductions section), select conclusion follows. If you think the conclusion does not follow beyond a reasonable doubt based on the facts given, select conclusion does not follow. Do not use general knowledge when answering, only use the information provided in the passage.

Statement 1

A study of vocabulary growth in children from ages eight months to six years old shows that the size of spoken vocabulary increases from zero words at age eight months to 2,562 words at age six years.

Proposed Conclusions

1. None of the children in this study had learned to talk by the age of six months
 - Conclusion follows
 - Conclusion not follow

2. Vocabulary growth is slowest during the period when children are learning to walk.
 - Conclusion follows
 - Conclusion not follow

Statement 2

Hannah has been a solicitor for three years. She works for a law firm in central London and has hopes of being promoted. To be promoted in Hannah's firm, employees must have at least four years' experience practicing as a solicitor.

Proposed Conclusions

1. We cannot know whether Hannah can be promoted or not.
 - Conclusion follows
 - Conclusion not follow

2. In 3 years' time, assuming Hannah has not been promoted; she will be over qualified for her current position.

- Conclusion follows
- Conclusion not follow

Statement 3

Treating a stroke is a race against time. Clots that block the blood supply prevent the flow of oxygen and sugar to brain cells, which then rapidly die. Recent studies have shown that some brain cells could withstand being starved of oxygen. The aim of researchers today is to develop a drug that can imitate that same effect.

Proposed Conclusions

1. Deprivation of oxygen to the brain is the reason for stroke related impairments.

- Conclusion follows
- Conclusion not follow

2. Development of a drug reduces the fact of having a stroke

- Conclusion follows
- Conclusion not follow

Section 4: Evaluation of Arguments

Instructions: When making important decisions, it is useful to be able to distinguish between a strong argument and a weak argument. A strong argument is both important and

directly related to the question. A weak argument is not directly related to the question, or is of minor importance or may be related to a trivial aspect of the question, or confuses correlation with causation (incorrectly assuming that because two things are related, they cause each other to happen). In this section, a statement is presented to you with an agreeing or disagreeing argument below. You must regard each argument as true, regardless whether it is weak or strong, agrees or disagrees with the statement. If you consider an argument to be strong, select strong argument, or if you consider an argument to be weak, select weak argument.

Statement 1

Should employees, who have over 5 years of experience in the company, be bound by law to give employers an advance notice of 60 days upon resignation?

Proposed Arguments

1. Yes; research has shown that when forced to give an advanced notice, many employees have a change of heart and decide to stay, making their workplace a more stable and experienced environment.

● Strong

● Weak

2. No; you cannot force an employee for making personal choices

● Strong

● Weak

Statement 2

Would stationing speed cameras, alongside main roads, reduce the amount of fatal car accidents?

Proposed Arguments

1. No; stationing speed cameras alongside main roads promotes a false sense of security.

- Strong

- Weak

2. Yes; believing that you are watched makes you do things right.

- Strong

- weak

Statement 3

Should all young adults in the United Kingdom go on to higher education at university?

Proposed Arguments

1. Yes; university provides an opportunity for them to wear university scarves

- Strong

- Weak

2. No; a large percentage of young adults do not have enough ability or interest to derive any benefit from university training

- Strong

- Weak

Date of Test:.....

Candidate Instruction:

After reading each statement, please, color the most appropriate answer.

Test1: Inference

- | | | T | PT | ID | PF | F |
|----|----|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1) | 1. | ☐ | ☐ | ☐ | ☐ | ☐ |
| | 2. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2) | 1. | ☐ | ☐ | ☐ | ☐ | ☐ |
| | 2. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3) | 1. | ☐ | ☐ | ☐ | ☐ | ☐ |
| | 2. | ☐ | ☐ | ☐ | ☐ | ☐ |

Test2: Recognition of Assumptions
Assumption made

- | | Yes | No |
|-------|-----------------------|-----------------------|
| 1) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |
| 2) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |
| 3) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |

Test3: Deduction
Conclusion follows

- | | Yes | No |
|-------|-----------------------|-----------------------|
| 1) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |
| 2) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |
| 3) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |

Test4: Interpretation

Conclusion follows

- | | Yes | No |
|-------|-----------------------|-----------------------|
| 1) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |
| 2) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |
| 3) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |

Test5: Evaluation of Arguments
Argument

- | | Strong | Weak |
|-------|-----------------------|-----------------------|
| 1) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |
| 2) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |
| 3) 1. | ☐ | ☐ |
| 2. | ☐ | ☐ |

Students' Questionnaire

Dear students,

We are conducting a research about the effectiveness of VTR (Visible Thinking Routines) on your CTS (Critical Thinking Skills) progress, we are kindly requesting your help in answering the following questions by putting a cross (x) in the right choice according to your point view.

Section One: Background Information

Q1) Gender:

a) Male

b) female

Q2) Age:

Section Two: Students' Reflections towards Visible Thinking Routines

Q3) please, read each statement stated below and rate yourself honestly based on what you have experienced during the treatment.

Statement	agree	Neither agree nor disagree	Disagree
I have recognized a change in my learning experience between the beginning of the lesson and the end of the lesson while using these routines.			
I have recognized a change in my thinking and cognitive skills at the end of the lesson			

The routines adopted in the treatment helped me to think more critically, understand and synthesize the information I get in the class compared to the traditional teaching methods			
The routines applied were very interesting and engaging			
I have enjoyed most of the routines applied in the treatment			
Applying these routines, I think the identified goals of the lesson have been achieved			
Applying these routines helped me to overcome and solve several struggles and pitfalls that I have been facing in the learning process			
I think that the integration of VTR in the educational system will improve the learning / teaching process			
I think our teachers should adopt more these routines in class because they boost my thinking skills			

Thank you for your collaboration

Appendix C

SEE / THINK / WONDER

A routine for exploring works of art and other interesting things

- What do you see?
- What do you think about that?
- What does it make you wonder?

Purpose: What kind of thinking does this routine encourage?

This routine encourages students to make careful observations and thoughtful interpretations. It helps stimulate curiosity and sets the stage for inquiry.

Application: When and where can it be used?

Use this routine when you want students to think carefully about why something looks the way it does or is the way it is. Use the routine at the beginning of a new unit to motivate student interest or try it with an object that connects to a topic during the unit of study. Consider using the routine with an interesting object near the end of a unit to encourage students to further apply their new knowledge and ideas.

Launch: What are some tips for starting and using this routine?

Ask students to make an observation about an object – it could be an artwork, image, artifact or topic – and follow up with what they think might be going on or what they think this observation might be. Encourage students to back up their interpretation with reasons. Ask students to think about what this makes them wonder about the object or topic.

The routine works best when a student responds by using the three stems together at the same time, i.e., “*I see...*, *I think...*, *I wonder* “ However, you may find that students begin by using one step at a time, and that you need to scaffold each response with a follow up question for the next stem.

The routine works well in a group discussion but in some cases you may want to ask students to try the routine individually on paper or in their heads before sharing out as a class. Student responses to the routine can be written down and recorded so that a class chart of observations, interpretations and wonderings are listed for all to see and return to during the course of study.

Appendix D

3-2-1 BRIDGE

A routine for activating prior knowledge and making connections

Your initial responses to the topic	Your new responses to the topic
3 Thoughts/Ideas	3 Thoughts/Ideas
2 Questions	2 Questions
1 Analogy	1 Analogy

Bridge:

- Explain how your new responses connect to your initial responses?

Purpose: What kind of thinking does this routine encourage?

This routine asks students to uncover their initial thoughts, ideas, questions and understandings about a topic and then to connect these to new thinking about the topic after they have received some instruction.

Application: When and where can it be used?

This routine can be used when students are developing understanding of a concept over time. It may be a concept that they know a lot about in one context but instruction will focus their learning in a new direction, or it may be a concept about which students have only informal knowledge. Whenever new information is gained, bridges can be built between new ideas and prior understanding. The focus is on understanding and connecting one's thinking, rather than pushing it toward a specific outcome.

Launch: What are some tips for starting and using this routine?

This routine can be introduced by having students do an initial 3, 2, 1 individually on paper. For instance, if the topic is "democracy," then students would write down 3 thoughts, 2 questions, and 1 analogy. Students might then read an article, watch a video, or engage in an activity having to do with democracy. Provocative experiences that push students thinking in new directions are best. After the experience, students complete another 3, 2, 1. Students then share their initial and new thinking, explaining to their partners how and why their thinking shifted.

Make it clear to students that their initial thinking is not right or wrong, it is just a starting point.

Appendix E

CONNECT / EXTEND / CHALLENGE

A routine for connecting new ideas to prior knowledge

CONNECT:

How the ideas and information presented are CONNECTED to what you already knew?

EXTEND:

What new ideas did you get that EXTENDED or pushed your thinking in new directions?

CHALLENGE:

What is still CHALLENGING or confusing for you to get your mind around? What questions, wonderings or puzzles do you now have?

Purpose: What kind of thinking does this routine encourage?

The routine helps students make connections between new ideas and prior knowledge. It also encourages them to take stock of ongoing questions, puzzles and difficulties as they reflect on what they are learning.

Application: When and where can it be used?

The natural place to use the Connect-Extend-Challenge routine is after students have learned something new. It doesn't matter how *much* they have learned – it can be a lesson's worth, or a unit's worth. The routine is broadly applicable: Use it after students have explored a work of art, or anything else in the curriculum. Try it as a reflection during a lesson, after a longer project, or when completing a unit of study. Try using it after another routine!

Launch: What are some tips for starting and using this routine?

This routine works well with the whole class, in small groups or individually. Keep a visible record of students' ideas. If you are working in a group, ask students to share some of their thoughts and collect a list of ideas in each of the three categories. Or have students write their individual responses on post-it notes and add them to a class chart. Keep students' visible thinking alive over time: Continually add new ideas to the lists and revisit the ideas and questions on the chart as students' understanding around a topic develops.

Appendix F

The Micro Lab Protocol

Reflect individually on the issue or topic being examined, then working in triads:

- **Share:** The first person in the group shares for a set time (usually 1–2 minutes). The other members listen attentively without comment or interruption.
- **Pause** for 20–30 seconds of silence to take in what was said.
- **Repeat** for persons two and three, pausing for a moment of silence after each round.
- **Discuss** as a group (5–10 minutes), referencing the comments that have been made and making connections between the responses of the group.

Purpose: what kind of thinking this routine encourage?

This routine is designed to ensure equal participation and make sure everyone contributes during class discussion. It also helps to build active listening skills and the ability to build on and connect to others' ideas.

Application: When and where can it be used?

Use this routine To discuss and explore perspectives on current and events, to reflect and share what one has learned so far, to explore and process to discuss possible problem-solving Strategies

Launch: What are some tips for starting and using this routine?

- 1. Set up:** inform the learners of what you want to discuss and what you hope they will get out of these discussions. Give 5-10 to reflect
- 2. Share:** learner 1 begins sharing for set time (1-2 minutes). No one speaks except the speaker.
- 3. Pause:** Allow 20-30 seconds of silence for everyone to process what was heard. In the beginning you may ask students just to mentally review what they heard.
- 4. Repeat:** repeat steps 2 and 3 above until every member of the group has shared their thinking if a learner finishes speaking before times' up, the group spends the rest of the time reflecting in silence.
- 5. Discuss:** groups can now engage in an open discussion for a predetermined time (5-10 minutes). Encourage groups to begin by making connections between what others have said or asking questions of clarification.
- 6. Share the thinking:** As a whole group ask students to reflect on the protocol itself and how they felt it facilitated their thinking about the issue or topic.

Appendix G

I USED TO THINK..., BUT NOW I THINK...

Remind students of the topic you want them to consider. It could be the ideal itself—fairness, truth, understanding, or creativity—or it could be the unit you are studying. Have students write a response using each of the sentence stems:

- I used to think....
- But now, I think...

Purpose: What kind of thinking does this routine encourage?

This routine helps students to reflect on their thinking about a topic or issue and explore how and why that thinking has changed. It can be useful in consolidating new learning as students identify their new understandings, opinions, and beliefs. By examining and explaining how and why their thinking has changed, students are developing their reasoning abilities and recognizing cause and effect relationships.

Application: When and where can it be used?

This routine can be used whenever students' initial thoughts, opinions, or beliefs are likely to have changed as a result of instruction or experience. For instance, after reading new information, watching a film, listening to a speaker, experiencing something new, having a class discussion, at the end of a unit of study, and so on.

Launch: What are some tips for starting and using this routine?

Explain to students that the purpose of this activity is to help them reflect on their thinking about the topic and to identify how their ideas have changed over time. For instance:

When we began this study of _____, you all had some initial ideas about it and what it was all about. In just a few sentences, I want to write what it is that you used to think about _____. Take a minute to think back and then write down your response to “I used to think...”

Now, I want you to think about how your ideas about _____ have changed as a result of what we've been studying/doing/discussing. Again in just a few sentences write down what you now think about _____. Start your sentences with, “But now, I think...”

Have students share and explain their shifts in thinking. Initially it is good to do this as a whole group so that you can probe students' thinking and push them to explain. Once students become accustomed to explaining their thinking, students can share with one another in small groups or pairs.

Appendix H

CIRCLE OF VIEWPOINTS ROUTINE

A routine for exploring diverse perspectives

Brainstorm a list of different perspectives and then use this script skeleton to explore each one:

1. I AM THINKING OF ...*the topic* ... FROM THE POINT OF VIEW OF...*the viewpoint you've chosen*
2. I THINK...*describe the topic from your viewpoint. Be an actor-take on the character of your viewpoint*
3. A QUESTION I HAVE FROM THIS VIEWPOINT IS...*ask a question from this viewpoint*

WRAP UP: *What new ideas do you have about the topic that you didn't have before? What new questions do you have?*

Purpose: What kind of thinking does this routine encourage?

This routine helps students consider different and diverse perspectives involved in and around a topic. Understanding that people may think and feel differently about things is a key aspect of the Fairness Ideal.

Application: When and where can it be used?

This routine can be used at the beginning of a unit of study to help students brainstorm new perspectives about a topic, and imagine different characters, themes and questions connected to it. It can be used after reading a book or chapter. Provocative topics and issues are encouraged and the routine also works especially well when students are having a hard time seeing other perspectives or when things seem black and white. The routine can be used to open discussions about dilemmas and other controversial issues.

Launch: What are some tips for starting and using this routine?

After identifying a topic, ask students to brainstorm various viewpoints about this topic. This can be done solo, or as a class, but make sure to give the initial brainstorm enough time for students to really stretch and explore diverse ideas. If students need help thinking of different viewpoints, try using the following prompts:

- How does it look from different points in space and different points in time?
- Who (and what) is affected by it?
- Who is involved?
- Who might care?

After the brainstorm, ask each student to choose one of these viewpoints. Give them time to prepare to speak about the topic from that perspective and to embody the viewpoint using the script skeleton to structure what he or she says.

Once students have prepared their “characters”, the class should be ready to go around the circle and act out their various perspectives. Taking turns, ask students to speak briefly about their chosen viewpoint using the script skeleton. Invite them to stand up and use gestures and movement if necessary. The discussion at this point might move fairly quickly, capitalizing on the immediacy of the experience as each student goes through the script and presents a perspective. The array of responses will hopefully be broad and distinct, as each student should strive to produce a unique viewpoint. If some students choose the same character, encourage them to perform differently. For example, if several students choose the viewpoint of an explorer, one may be trying to seek out wealth through trade, another explorer might be adventurous or want to become famous. Ask them to raise different questions in order to elaborate their viewpoints.

Viewpoints connect to the idea of physical perspective taking and you may notice that your students interpret this literally at first by naming and describing what their characters *see*. While it is fine to help students get started with concrete examples, try to move your students to consider *thoughts and feelings* of characters, rather than describing a scene or object.

As students perform their viewpoint in the circle, their ideas can be recorded or written on the board so that a class list of perspectives is created. The last question of the routine asks students to think of a question they might have from their chosen viewpoint. Collect these questions or ask students to write them down and answer them as they think more about the topic as it is studied in class. Once everyone in the circle has spoken, the teacher can lead a discussion by asking: “What new ideas do you have about the topic that you didn’t have before?” and “What new questions do you have?”