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*A Causal Comparative Study into the Effects of Cognitive
style and Academic Streams on EFL Students' Academic
Achievement
Case of EFL Master 2 Students*

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"He has not thank Allah who has not thank people"

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Abstract

Cognitive style is an individual learning trait that has a significant effect on students' academic achievement. The present study seeks to determine the influence of field dependence-independence cognitive style and academic streams (scientific and literary) on students' academic achievement in L2 learning. Further, this study aims to establish a profound understanding about EFL teachers' perception of cognitive style and its effects on second language teaching-learning and academic achievement. This is a causal comparative research. Data were collected using two different instruments; Cognitive Style Questionnaire (CSQ) developed by Wyss (2002), was distributed online to (40) Master 2 EFL students to investigate their cognitive style tendency as well as their academic streams. The CSQ was reinforced with students' scores list pertaining to the first semester of the academic year 2019-2020. As well, an interview was conducted with 5 EFL teachers at M'sila University to examine their perception of cognitive style. Data collected were analyzed quantitatively and qualitatively. Three hypotheses were tested at 0.05 level of significance and data collected were analyzed using Descriptive Statistics, Chi Square and Phi Coefficient tests. The results proved a significant main difference between scientific and literary streams and students' cognitive styles ($P=0.031$; $P < 0.05$), a significant main difference between field dependent and field independent students and their achievement in L2 learning ($P=0.037$; $P > 0.05$) and a significant main difference between scientific and literary students and their achievement in L2 learning ($P=0.025$; $P > 0.05$). Moreover, interview data analysis revealed that EFL teachers held high awareness levels of cognitive style and they assent on the importance of cognitive style as potent variable that may improve L2 learning. Therefore, it is suggested that teachers investigate the foremost cognitive style and academic stream category in their classes, as this could smooth a meaningful learning as well as assist as director for teaching methods selection. In addition, raising students' awareness about their cognitive styles and motivate them to engage in other styles is recommended to help them compensate learning deficiencies and reshape their behavioral strategies of learners.

Key Terms: Cognitive Style, Stream, EFL, Achievement, Awareness

LIST OF ABBREVIATIONS AND ACRONYMS

FDI: Field Dependence-Independence.

FI: Field Independent.

FD: Field Dependent.

EFL: English as Foreign Language.

ESL: English as Second Language.

L2: Second Language.

BAT: Body Adjustment Test.

RFT: Rod and Frame Test.

EFT: The Embedded Figure Test.

GEFT: Group Embedded Figure Test.

CEFT: Children's Embedded Figure Test.

CSQ: Cognitive Style Questionnaire.

CSC: Cognitive Style Checklist.

SPSS: Statistical Package for the Social Sciences.

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Introduction

1. Background of the Study

The issue of individual differences has received considerable critical attention by scholars due to their significant effects on teaching-learning process as well as on learning achievement. In fact, many factors have been exposed to have substantial effect on students learning outcomes across many fields. According to Korau (2006, as cited in Nbina, 2012), one of the sets of factors is the learner factor. In other words, the learner himself is a vital factor in defining whether significative learning will occur or not. This may comprise his background, motivation, age, gender, motivation, personality, cognitive style and so forth (Bassey et al., 2013). Correspondingly, Mokhtarian (2003) states that each student has a particular learning style that does not change or develop. He further argues that there are individual variations among students with regard to learning. Thus, they approach their academic tasks differently. These differences reflect their cognitive styles rather than their intellectual ability. The fact that some students perform one single academic task differently in similar conditions demonstrates that they are different as regards to processing and organizing information and reaction to environmental stimuli (Mokhtarian, 2003).

The construct of cognitive style was originally proposed by Allport, almost eight decades ago. He terms it as an individual's habitual or typical mode of problem solving, thinking, perceiving and remembering (Allport, 1937, as cited in. Kefee, 1979). Since Then, there has been a considerable further research in this field, particularly in the last few decades. For instance, Chen and Macreadie (2002) define cognitive style as an individual preferred and habitual approach of organizing and representing information. In the same line of thought, habitual approach of organizing and representing information. Correspondingly, Witkin et al. (1977) label cognitive styles are individual differences that deal with how people interpret, think, solve problems, know, and relate to others. Further, Curry (1983) identifies cognitive style as the individual approach to adjust and assimilate knowledge that is not specifically

interacting with the environment, but is an underlying and fairly permanent aspect of personality that is found through several learning instances. Therefore, cognitive style, here, is treated as a static trait of a person, relatively in-built and reasonably set. Then, individuals can vary their learning strategy or learning method as appropriate, but the underlying cognitive style remains relatively constant.

There have been so many classifications of cognitive style in the last thirty years. For instance, Riding and Cheema's (1991) Wholist-Analytic and Verbal-Imagery, Kegan's (1964) Reflection- Impulsivity, Pask's (1972) Holist- Serialist, Asuzu and Onwu's (1989) Relational-Inferential and Witkin's (1971) Field Dependence-Independence models.

Among all the theoretical classifications of cognitive style, the one that was widely examined in the last twenty years is Witkin's theory of field dependence-independence cognitive style (DeTure, 2004). This theory is centered on how people perceive the upright in the space. Further, it is based on two standards; the upright indicated by the external visual field and the upright indicated by the body itself or the gravitational pull (Witkin et al., 1971). Predominantly, Field Dependence – Independence cognitive style is a trait of an individual that is characterized by a specific way of thinking, problem solving and relations with others (Witkin and Goodenough, 1981). Based on this cognitive style dimension, field dependent individuals are portrayed as holistic, insecure and dependent on others, while field independent individuals are depicted as “analytical, self-reliant and confident” (Chapelle and Green, 1992: 49). In the same line of thought, Daniels (1996) suggests that FI individuals are capable of reorganizing and encoding information efficiently in memory functioning, which can provide structure and richer semantic links. Comparatively, FD individuals have little reorganization abilities and inefficient encoding capabilities, and prefer to accept the structure given. FD individuals can create fewer links, and have isolated storage in their long-term memory. Moreover, FI individuals often play active roles in processing information, and are likely to reorganize an element in the field spontaneously (Goodenough, 1976; Witkin et al. 1977).

Based on thirty years of field dependence -independence research, Wiktin et al. (1977)

presume that their cognitive style approach is likely to be productively applied to problems relevant to education. Further, this cognitive style dimension among others, was assumed to have a significant main impact on students' academic achievement. The latter, however, is defined as a measurable behavior in a standardized test sequence. It is seen in many academic setting as the grade point averages of students; therefore it occupies a crucial place in education as well as in the learning process (Razali & Alam, 2015).

Extensive research has been conducted to investigate the relationship between Field Dependence-Independence cognitive style and academic achievement. Predominantly, field independent students have been shown to be higher achievers than their counterparts of field dependent students across many disciplines. Yaghubi (2006), among many other researchers, investigates the association of Field Dependence - Independence cognitive styles with success in language learning of English learners at Teacher Training University. He concludes that field independent students are relatively better than field dependent students in learning and comprehension. Correspondingly, Mokhtarian (2003) finds out a significant association of high school students' and teachers' cognitive styles (Field Dependence/ Independence) with student's academic achievement. Similarly, Samavati (2001) explores the relationship between cognitive styles (convergent, divergent, observative and adaptive) and locus of control (internal and external). The study findings indicate that there is an important variation among overall different major groups regarding cognitive styles. Accordingly, Khodabakhsh (2011) concludes that students' match scores are significantly associated with their cognitive styles (Field Dependence / Independence). Together with these studies, researches also examine students' and teachers' cognitive styles and find that Field Independent students are more effective when they are instructed by Field Independent teachers. Coupled with the previous findings, Homayooni et al. (2006) reveals that Field Independent students taught by Field Independent teachers, instead of Field Dependent teachers are more successful in sciences. Furthermore, Geetanjali (2006) stresses that cognitive styles has a crucial influence on a student's academic achievement. He claims that the more field independence was delivered to the students, the

higher became the academic achievement. In experimentations that aim to elaborate differences in achievement between field independent (FI) and field dependent (FD) persons, Rollock (1992) study detects that FI learners, when confronting with a restricted amount of unambiguous assignment relevant information, will often outdo their FD learner. In the same line of thought, Sharma et al. (2006) find that those individuals who have gained more academic achievements tend to be field independent when compared with those who are less successful in their studies (Khodabakhsh, 2011). Likewise, Homayooni et al. (2006) conclude that there exists a significant positive relationship between field independence and academic achievement, particularly when intelligence – as a variable – is controlled. Angeli et al. (2009) deduce that Field Independence and success in English language are positively correlated.

To sum up, it is obvious that field dependence- independence cognitive style has a significant relationship with students' academic achievement. Additionally, most studies conducted in the field show that field independent individuals are more successful than field dependent individuals in many fields.

2.Statement of the Problem

Numerous researchers in the field of individual differences and more specifically those who deal with cognitive style construct, assent that this individual trait has a chief effect students' overall academic achievement. For instance, Verma and Swain (1991) who investigate the impact of cognitive style on academic achievement in a series of inquiries that incorporated many disciplines, conclude that field independent individuals substantially achieve higher mean scores in English, Mathematics, General Sciences, Social Studies and Drawing whether they are separate or together than their field dependent counterparts. Accordingly, Hansen and Stanfield (1982) demonstrate that field independent student perform better than field independent students in L2 learning which in this case, was Spanish. Further, they argue that the FI restructuring capacities obviously contribute to linguistic and communicative success, and integrative performance in formal course at the university level. It

is obvious from the conclusions of several studies fulfilled in the field of cognitive style, that this construct has a significant impact on students' academic achievement. Moreover, most of these studies assent that field independence is an attribute of success in many fields.

As the findings of many earlier studies indicate, students' cognitive style has a positive significant relationship with their academic achievement across many disciplines with field independence students predominantly outperform their counterparts of field dependence students. However, despite all the studies done on the relationship of students' cognitive style with their academic achievement, cognitive styles in EFL classrooms and more specifically EFL classrooms in Algeria have not received the due attention and scrutiny to uncover the patterns by which EFL students' field dependence/independence cognitive styles and their former academic stream influence their academic achievement and the ways in which, EFL teachers at M'sila university in Algeria conceptualize and treat the notion of cognitive style and its effects on L2 teaching and Learning process as well as on students' academic achievement.

3. Aims of the Study

The purpose of this study is to find out to what extent students' cognitive styles and academic streams at secondary school impact their academic achievement in L2 learning at the university. Further, this study aims to investigate the ways EFL teachers perceive cognitive styles in L2 context and to what extent they are aware of such paramount learning style and their influence on the overall L2 teaching-learning process and academic achievement.

4. Significance of the Study

The significance of this study lies in many points; initially, cognitive style is a potent variable in students' academic achievement. Thus, awareness of this variable may assist in modifying thought and behavioral strategies of learners. Moreover, moderation can also be incorporated into teaching so that students are taught how to learn, thereby, reducing frustration for both the learner and the teacher. Moreover, the consideration of cognitive styles and students' academic achievement are substantial criteria in the development and implementation

of both curricular and instructional performance. Further, students can improve their learning efficacy through being conscious of their cognitive styles. Thus, by working on cognitive style fields, students can be supplied by different techniques to boost their intellectual development. Correspondingly, teachers can distinguish strong style constructs in their classes and use the appropriate approaches to conciliate cognitive style preferences. Additionally, the data provided by cognitive styles and academic streams will be helpful for curriculum designers and classroom teachers to adopt the appropriate approaches to promote significant learning. Students' cognitive styles awareness would be very beneficial in both, academic and career counseling.

5. Research Questions and Research Hypothesis

The present study seeks to answer the following research questions:

1. Is there a statistically significant difference between scientific and literary streams in the cognitive style?
2. Is there a statistically significant difference between successful and unsuccessful EFL students in their cognitive style?
3. Is there a statistically significant difference between scientific and literary students in their academic success in EFL learning?
4. What perception do EFL teachers hold about cognitive styles and the effects they have on language teaching and learning?

To investigate each of the above research questions, the following research hypotheses are posed:

1. H1: There is no statistically difference between the two groups and cognitive styles.
2. H2: There is no statistically difference between successful and unsuccessful EFL students in their cognitive styles.
3. H3: There is no statistically difference between scientific and literary students in

their academic success in EFL learning.

4. H4: EFL teachers may not hold supporting perceptions about the effects cognitive styles may have on language teaching and learning.

6. Overview of Research Methodology:

Since the primary objective of this study are to examine the association of students' academic stream and their cognitive style with their achievement in L2 learning, then the causal-comparative design is the most appropriate design in quantitative research for this study. Regarding data collection, a Cognitive Style Questionnaire (CSQ) is used to investigate the sample's cognitive style and academic stream supported with first semester scores list of Master 2 students that has been provided by the administration. Further, an interview is also utilized as a second data collection tool in this research. It was dedicated for EFL teachers to obtain a deep and grounded understanding on their perception of cognitive styles and their effects on L2 teaching learning process. In addition, sample of this study is drawn randomly from Master 2 EFL students. It comprises of (40) participants coupled with (5) EFL teachers at M'sila University. For teachers, the sample encompasses (5) EFL teachers. For data analysis, Cognitive Style Questionnaire and students' scores were analyzed quantitatively using SPSS version 20, whereas the interview was analyzed qualitatively.

7. Key Terms

Cognition: is the process, by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used (Neisser, 1967).

Cognitive Style: is a "thinking style", it is a term employed in cognitive psychology to describe the way individuals think, perceive and recall information. This construct reflects the dimensions of individual differences in the cognitive sphere, where individual remains relatively on a constant position. Those dimensions characterize individual's variation in mental

activity form (Uto, 1994).

Academic Achievement: a measurable behavior in a standardized test sequence. It is seen in many academic setting as the grade point averages of students; therefore it occupies a crucial place in education as well as in the learning process (Razali & Alam, 2015).

Academic Stream: is the academic specialty in which students in the first year of secondary education will have to opt for a range of subjects in order to continue their specialty in the second and third year, it includes two divisions: science and technology, and literature and philosophy.

Field Dependence-Independence: is a value neutral and described as the ability to separate key elements from a distracting or ambiguous contexts. It is a term that refers to an individual's ability to identify or trace out a figure embedded in complex context. Those who can trace out the figures to a large extent are considered to be field independent individuals, whereas those who can not trace out the figures to a significant extent are considered to be field dependent individuals (Blanton, 2004).

Field Independent individuals: are analytical learners. These learners are distinguished by their analytical approach and problem solving capacities. They tend to be more intrinsically motivated and task-oriented in their learning process than field dependent individuals. (Witkin et al., 1971).

Field Dependent Individuals: are more socially oriented students. They pay a greater attention to social indicators, they like being with others, and seek learning and vocational experiences that make them in contact with people (Witkin & Goodenough, 1981)

8. The structure of the study

The present study is a whole of two main chapters; on one hand, the first chapter deals with the theoretical part of the study and reviews the related literature. On the other hand, the second one is concerned with the practical part of the study.

Chapter one provides a better understanding of research variables. It sheds the light on reviewing the related literature regarding cognitive style, its theoretical classifications, its theories and its influence on teaching-learning process. In addition, the first chapter tackles reviews on educational system in Algeria, academic streams and assesses the relationship between cognitive style and academic achievement across many fields.

On the other hand, chapter two deals with reseach methodology, comprising research design, sample, setting, data collection and statistical tools in addition to procedures of the study. Further, this chapter contains the data analysis, interpretation and discussion of the findings.

Introduction

This chapter represents the theoretical frame of the current study. It is chiefly dedicated to explore the foremost literature that has a strong association with the variables of this research. In this chapter, the literature review is a whole of three sections. The first section tackles the cognitive style construct, it's overlapping with other notions like intelligence, its major theories coupled with their measurement tools, and its significance to teaching-learning process and vocational choices. Further, the next section provides a succinct overview on the educational system and the academic streams in Algeria. Lastly, the third section sheds the light on the association between cognitive style and academic achievement. In other words, it assesses the previous findings on the impact of Field Dependence- Independence cognitive style on students' academic achievement on language particularly and in many fields generally.

1. Cognition, Cognitive Style and Its Significant Elements

Cognition and cognitive style are commonly two interrelated concepts that are used interchangeably by psychologists specifically and scholars generally to investigate individuals thinking and the ways they adopt to solve problems. Initially, this section provides a thorough description of both cognition and cognitive style. Further, it emphasizes on cognitive psychology and the main elements of cognitive style such as its theoretical classification and its chief theories. Moreover, such section deals with the most widely examined cognitive style in the literature which is, Witkin's field dependence-independence cognitive style theory. Thus, this section supplies a comprehensive explanation of the development of this cognitive style, its measurement tools and its effect on teaching learning process. Ultimately, this section shows the influence of field dependence-independence cognitive style and its impact on learners' vocational decisions.

1. Definition of Cognition

The concept of cognition is chiefly used to refer to the higher mental processes. Predominantly, cognition may include mental processes such as thinking and conceptualization.

It deals with issues such as: memory, visual imagery, interpretation and comprehension, reasoning and decision making and representation (Musya, 2015). Further, Neisser (1967) distinguishes cognition as all processes that transform, minimize, elaborate, store, recover and use the sensory input. These processes are concerned even when they operate in the absence of appropriate stimuli, such as images and hallucinations. Accordingly, cognition denotes to a mental process in the brain used to gain knowledge and comprehension of the outside world (Gibbs, 2009, as cited in. Muhammad et al., 2015). In other words, people tend to perceive, criticize information and learn through different ways.

2. Cognitive Psychology

As it is demonstrated in “American Psychological Association” (2013), Cognitive psychology refers to the study of perceiving, understanding, recalling, and thinking of knowledge. That is, a cognitive psychologist may research how people interpret various objects, why they remember some details but forget others, or how they learn language.

George Mandler (2002) describes the origins of cognitive psychology. Ulric Neisser is credited with formally having coined the term “cognitive psychology” (in terms of the current understanding of cognitive psychology) in his book *Cognitive Psychology*, published in 1967 (Neisser, 1967).

According to Neisser (1967), dynamic psychology, which starts with motives rather than the sensory input, is a case in point. Instead of questioning whether the behaviors and perceptions of a person derive from what he saw, recalled, or believed, the dynamic psychologist asks how they follow from the subject’s goals, needs, or instincts.

Modern views on cognitive psychology generally address cognition as a dual process theory, introduced by Jonathan Haidt in 2006, and expounded upon by Daniel Kahneman in 2011 (Kahneman, 2003). Kahneman (2003) differentiates the two styles of processing more, calling them intuition and reasoning. Intuition, the same to associative reasoning, was determined to be quick and automatic, sometimes with strong emotional bonds included in the

reasoning process. Kahneman said that this type of reasoning was based on formed habits and extremely troublesome to alter or manipulate. Reasoning was slower and much more volatile, being subject to conscious judgments and attitudes.

3. Cognitive Styles

1.3.1. Definition of Cognitive Style

Cognitive style has been used by researchers to investigate how individuals process information and make choices in learning. Thus, it can be viewed as an individual preferred and habitual approach of organizing and representing information (Chen & Macreadie, 2002). Accordingly, a “style does not refer to the content of thought; rather it deals with the way in which information is organized-the pattern of thought” (Riding & Rayner, 2000, p.41). Additionally, cognitive style is a psychological concept and it was initially introduced by Allport (1937, as cited in Keffe, 1987) who considers cognitive style as a term, to denote how distinctive personality types influence the quality of living and adapting. Furthermore, Witkin et al. (1977) label cognitive styles are individual differences that deal with how people interpret, think, solve problems, know, and relate to others.

Naroozi (2003) states that cognitive styles have been described in a border between mental abilities and personality types. That is, they are thinking styles which may influence and are influenced by cognitive abilities. In the same line of thought, Pitcher (2002) defines cognitive style as the relatively stable strategies, preferences and attitudes that determines an individual’s typical modes of perceiving, remembering and problem solving. Predominantly, Bettey et al. (1971, as cited in Musya, 2015) describe cognitive style as an umbrella term covering the many ways an individual perceives, organizes, classifies, and or label various environmental factors. There are several classifications of cognitive style, but the one that granted the foremost attention which has been investigated to date by researchers is Witkin’s Field Dependence – Independence cognitive style (Witkin & Goodenough, 1981). Field Dependence (FD) and Field Independence (FI) are explained correspondingly as opposing inclinations to depend mostly on either exterior or interior framings of referent in information

processing (Hansen & Stanfield, 1982). Hypothetically, Field Dependence nurtures an utmost skill in interpersonal rapport, whereas Field Independence fosters an utmost restructuring capacity on different intuitive and cognitive assignments (Witkin & Goodenough, 1977).

1.3.2. Cognitive Styles and Intelligence

According to Riding and Rayner (2000), cognitive style and intelligence are two distinctive theories to the cognition comprehension. Further, they summarize such distinctions in different points.

Firstly, intelligence scaling is about evaluating one's ability, pace and the amount of information he can deal with while for cognitive style scaling, it deals only with the typical forms and the quantity of information one handles. Moreover, Intelligence theory is related to genetic interference, whereas cognitive style theories is all about learning of the ways individuals think. Furthermore, intelligence measuring is based on "good-bad" measures. Conversely, cognitive style theories are based on inclination to overall styles as valued in the appropriate time. To sum up, intelligence theory deals with classifying individuals in permanent groups evaluated from "good" to "bad" in overall conditions while for cognitive styles theories, they regard the potential alternation of the style to suit the conditions. Considering most tests imprecisions, style theories are possibly less threatening than intelligence ones as instruments for applying usage (Riding & Rayner, 2000).

1.3.3. Cognitive Styles, Learning Styles and Learning Strategies

In fact, a great deal of misperception reveals in the literature regarding cognitive styles, learning styles and learning strategies terms. Consequently, a considerable number of researchers deal with the terms interchangeably. Nevertheless, numerous authors and researchers conceptualize the terms differently.

For instance, Wang (2008) states that "Learning styles refer to an individuals' characteristics and preferred way of gathering, interpreting, organizing and thinking about information" (p.30). In general, it is recognized that cognitive styles are significant components of learning styles. However, cognitive styles are labelled as "a psychological construct relating

to how individuals process information” (Brown and Brailsford, 2006, p.327), and they have several categorizations like, Field Dependence-Independence and Impulsivity-Reflectivity cognitive styles. On the other hand, Maraco (2006) characterizes learning strategies as “any set of operations, plans or routines used by learners to facilitate the obtaining, retrieval, storage and use of information” (p.324). These strategies are further categorized by Oxford (1990) into indirect and direct strategies based on their direct overlapping to the target language or not.

Evidently, cognitive styles, learning styles and learning strategies are distinct. For cognitive styles, they handle individuals’ preferences in making sense out of their surrounding environment by gathering, examining, assessing and elucidating data (Messick, 1984). Further, Jonassen and Grabowski (1993) argue that these styles are considered to persist constant preferences for lifelong. On the other hand, the learning styles are the learner’s unconscious characteristics (Shi, 2011). Further, a learning style is a comprehensive notion. In addition to data processing, “learning style also contains individual’s feelings and psychological behaviors” (Wang, 2009, p. 34-35). Comparatively, learning strategies are definite activities adopted by students to boost learning efficacy (Shi, 2011). Furthermore, according to Brown, directly function based on the learner’s inborn learning styles and further personality-linked factors (Li, 006, as cited in Shi, 2011).

4. Theoretical Classification of Cognitive Style

The various theoretical classifications of cognitive style encompass: Field Dependence - Independence, Holist - Serialist, Wholistic - Analytic and Relational - Inferential styles.

1.4.1. Field Dependence - Independence

The field dependence- independence (FDI) construct is amongst the most commonly studied of the range of cognitive style dimensions prevalent in the literature (DeTure, 2004). Field Dependence-Independence model identifies two contrasting types of processing information. That is, according to Riding and Cheema (1999), and Zhang (2004), individuals are positioned along a continuum ranging from extreme Field-Dependence (FD) to extreme Field-Independence (FI). Individuals are located towards the FD end of the continuum find it

difficult to separate incoming information from its contextual environment and are more likely to be influenced by external factors and to be non-personal in their taking up of information. On the other hand, FI individuals have less difficulty in distinguishing the most relevant information from its context, and are more likely to be influenced by Internally than externally, and to be selective in their information input (Riding & Cheema,1999 ;Zhang,2004). Furthermore, this cognitive style model can be measured using many measurement tools like the Body-Adjustment Test (BAT) and the Rod-and-Frame Test (RFT) which are based on an individual's propensity to use either visual or vestibular signals in perception of upright, whereas other tools like the Embedded Figures Test (EFT), the Group Embedded Figures Test (GEFT) which are based on pencil and paper to recognize simple figures in more complex figures which indicate which field one is inclined to (Riding & Rayner, 2000).

Although Field Dependence - Independence can be seen as an adaptively neutral style dimension, it seems obvious that children at opposite extremes of the Field Dependence - Independence continuum vary in their performance of diverse school tasks. Studies of the relationship between cognitive style and academic achievement showed that FI subjects in all areas of knowledge obtain better results than FD subjects of (e.g Roszkowski & Snelbecker,1987 ;Tinajero & Pàramero,1977, as cited in. Guisande et al., 2007).

1.4.2. Holist – Serialist

Additionally to the Field Independence/Dependence cognitive style measure, one more measure of cognitive style, i.e., Pask's Holist/Serialist (1979), was also discovered to be an effective aspect to student learning. The Holistic- Serialistic cognitive style was explored in the early 1970's by Pask. He evaluated a group of children by asking them to group a number of fictional animals. He found out that some children prefer to seek and grasp the basic concepts and build and test several hypotheses at the same time; these elements were holists or comprehensive students. Conversely, those children who kept with a sole hypothesis at one time and did not carry on while that was examined were considered as serialists, or

Pask and Scott (1972, as cited in, Keçici & Boze, 2014) refer to holistic individuals as

learners with regional approach to learning. Thus, they primarily examine the connection between different topics at the beginning of learning process and create broad conceptual framework within which, they subsequently place details. On the other hand, Serialistic individuals adopt a local approach. Hence, they investigate one issue at a time, concentrate on various topics orderly, and afterwards, connect these topics in a logical way (Pask & Scott, 1972, as cited in, Keçici & Boze, 2014).

The below table (01) summarizes the differences between Holists and Serialists:

Table 01: Differences between Holist and Serialist characteristics (Pask, 1979)

Holists	Serialists
Take a global approach and create conceptual links	Take an analytical approach, examining individual
Between objects early on.	Topics before forming conceptual links.
Are able to move between theory and real world	Analyzes theory or real world examples separately,
Examples from the beginning.	Only joining together if necessary.
Broad focus; likes to have more than one thing on	Narrow focus; prefers to focus on completing one task
They go at the same time.	Before moving on to the next.
Internally directed.	Externally directed.

1.4.3. Wholistic - Analytic

The Wholist - Analytic dimension (Riding,R J ; Cheema,I 1999) is closely associated within Field Independence - Field Dependence dimension (Wiktin et al., 1977). It reflects the popular way that a user organizes or processes information either in its totality (Wholist) or in parts (Analytic). In fact, the Wholist /Analytic dimension can be mapped to the Field Dependence - Field Independence dimension (Riding, R J; Rayner; S. G.2000). The Wholist /Analytic dimension is sometimes measured by an acceptable computer- based mostly test such as Cognitive Style Analysis (CSA), (Riding, R. J; Cheema, I. 1991). This test compares the

response time of a user whereas he /she responds to a set of analytic or wholistic questions. At the end of the test, every user is going to be assigned to one of these three groups: wholistic, analytic or intermediate. Further, Riding and Cheema characterize wholist individuals as they retain more holistic and overall view of information when processing, arranging and structuring it. Conversely, they identify analyst individuals as they dissect information into smaller chunks in order to process and organize it.

1.4.4. Relational – Inferential Styles

Onwu and Asuzu (1986) develop relational and inferential cognitive styles. They pointed out that relational style is a mode to associate objects or events on the basis of features establishing a relational link between them. People with relational style tend to group things together because of functional thematic relations (Onwu & Asuzo, 1986). For instance, both whales and sharks swim. On the other hand, Onwu and Asuzu (1986) define the inferential style as the tendency to associate objects or events on the basis of superordinate features that are not directly discernible but are inferred. Thus, it is an imaginative tendency. For example, a bus and a plane are similar because both are means of transportation. People with inferential categorical style tend to group objects together because of an abstract similarity that can be inferred but sometimes not directly observed in the picture, for example, both whales and tiger are mammals.

5. Cognitive Styles Theories

Cognitive style comprises different theories. They are: The Brain Theory, Reflection Impulsivity Theory, Field Dependence – Independence Theory and Deep – Surface Structure Theory. The previous mentioned theories are explained below:

1.5.1. The Brain Theory

Many writers attribute cognitive style to specialization in the hemispheres. Kane and Kane (1979) proposes the roles each hemisphere plays in a variety of different modes. The right brain is defined for thinking as deductive, intuitive, divergent, holistic, linked to concepts, simultaneity and geometry.

Conversely, the left brain is identified as inductive, segmented, convergent, logical and algebraic. Wheatley (1977; Wheatley et al., 1978) relates types of problem solving with specialization in the right and left brain. He defined the right brain as all-at-once and gestalt and the left as one-at-a-time and serial. Wheatley also deduced that a good problem solver smoothly achieves an integration of the two styles of thinking.

1.5.2. Reflection - Impulsivity Theory

Kegan et al. (1964) are the first researchers to propose the Reflection-Impulsivity cognitive style model, which they measure using the Matching Familiar Figures Test (MFFT). According to Rozenchwajg and Corroyer (2006), this visual comparison task requires participants to select one figure that matches a standard from several alternative figures. Then, two variables are measured; latency (time taken to respond) and accuracy (number of errors). Kegan et al. (1964) categorize individuals into two sets based on their scores on these two variables compared to the median-reflective individuals (long latency, high accuracy) and impulsive individuals (short latency, low accuracy).

With respect to the cognitive processes, Ancilloti (1984, as cited in. Rozenchwajg & Corroyer, 2006) finds that reflective individuals use an analytic processing mode, whereas impulsive individuals use a holistic processing mode. Further, Ancilloti (1984, as cited in. Rozenchwajg & Corroyer, 2006) suggests that impulsive individuals lack cognitive maturity, usually assessed by their operating level. Correspondingly, Lawry and Welsh and Jeffry (1983) find a similar result in which reflective individuals performed better than did impulsive individuals.

1.5.3. Field Dependence – Independence Theory

It is evident from the literature that Witkin's theory of field dependence-independence cognitive style has been commonly used in many studies due to their increasing applications in many fields. It was originally introduced by Witkin in the 1950s and the 1960s with educational implications by Witkin et al. (1977).

According to Witkin et al. (1977), original testing was done using the Body Adjustment Test and the Rod and Frame Test. In these tests subjects were asked to decide their alignment/misalignment with true vertical given internal and external stimuli which may differ (experimental set-up described in –depth by Witkin et al., 1977). It was found that one group of subjects determined their alignment as vertical based solely on the visual cues in the room. Witkin (1977) says that, “it might be astounding that someone can be tilted up to 35 degrees, and if in that position he is aligned to with the room, titled at the same angle, he will claim that he is perfectly straight, that ‘this is the way I eat my dinner’, ‘this is the way I sit in class” (p. 5).

According to Witkin et al. (1977), such subjects were field dependent, that they could not determine their vertical alignment due to a discordant visual field, whereas other subjects demonstrated field independence and were able to perceive their alignment as separate from the visual surroundings. Similarly, The Embedded-Figure Test determines a subject’s field dependence-independence inclination based on the time they take to find a specific figure in a more complex visual field (see Witkin et al, 1977 for examples). Subjects that were field dependent spend more time discovering the figure while field independent subjects easily discovered it.

Witkin et al. (1977) further address the relationship between teachers and students and their field dependence-independence. They find that field dependent students like working in groups, and require extrinsic motivation and more formal reinforcement from teachers. While, field independent students prefer individual work and appear to be intrinsically motivated.

The following table (2) summarizes the differences between field dependent and field independent individuals.

Table (02): Comparison between Field Independent Individuals and Field Dependent Individuals. (From Saracho & Spodek, 1981, p. 15)

Field Independent Individuals	Field Dependent Individuals
1-Perceive objects as separate from the field	1- Rely on the surrounding perceptual field
2- Can abstract an item from the surrounding field reorganized in different contexts.	2- Experience their environment in a relatively global fashion by conforming to the effects of the prevailing field or context .
3- Are socially detached but have analytic skills	3- Get closer to the person with whom they are interacting
4- Are insensitive to others, lacking social skills	4- Have a sensitivity to others that helps them to acquire social skills
5- Prefer occupation that allows them to work by themselves	5- Prefer occupations that require involvement with others
6- Are oriented towards active striving	6- Search for facial cues in those around them as a source of information
7- Experience and independence from authority , which leads them to depend on their own standards and values	7- Are dependent on authority

1.5.4. Deep level – Surface Levels Theory

The concept of approach to learning (deep and surface) emerges from a study conducted in the 1970s at the University of Gothenburg, Sweden by researchers Marton and Säljö. Initially, their work aims at investigating the difference in learning processes among students in higher education. According to Lubin (2003, as cited in. Islam & Shafiq, 2016), deep learning approach motivates students towards active inquiry to understand the materials or subjects, to interact vigorously with the contents, to relate the concepts with previous knowledge and real life experience. Similarly, Malhi (2013) contends that deep approach helps students to acquire desired knowledge, skills and personal attributes; and empower them to optimize their potential. Conversely, Lubin (2003, as cited in. Islam & Shafiq, 2016) states that surface approach tends to jump through the required hoops to attain the mark, or the grade, or the qualification rather than become interested and appreciate the subject or content.

In the same line of thought, Marton and Säljö (1976, as cited in. Lucas-Stannard, 2003) categorize students' responses after interpretation into two forms of processing in which learners were involved: surface learners were defined as those who only concentrated on understanding and memorizing the key points, while deep learners investigated the meaning

behind the subject and tried to connect to other information to help them understand it.

6. Field Independence-Dependence Development:

Field independence-dependence, is a cognitive variable, defines as “the extent to which a person perceives part of a field as discrete from the surrounding field as a whole ,rather than embedded ,or ... the extent to which a person perceives analytically” (Witkin et al., 1977, p.7).

Researchers differentiate field independent persons from field dependent persons by whether they « reflect preferred modes of relating to, classifying, assimilating and organizing the environment» (Witkin et al., 1962, p 71). Witkin et al. (2002) state that bipolar construct of field independence and field dependence measured the degree to which learners relied upon internal or external referents as they process information and interact with the surrounding filed. In general, field independent individuals view objects apart from the background, but field dependent individuals are distracted by the surrounding field. In other words, field independent individuals can easily ignore disassociated part, while field dependent individuals were easily affected by irrelevant details.

To make the characteristics of filed independence–dependence clearer and more specific, Saracho and Spodek (1981) provide a useful outline comparing the two cognitive styles (see table 3)

Table (03): Differences between Field Independence and Field Dependence.

Filed Independence	Field Dependence
Analytic	Global
Generates structure	Accepts structure
Internally directed	Externally directed
Philosophical , cognitive	Conflict resolution
Individualistic	Sociable and gregarious
Distant in social relations	Affiliation oriented
Intrapersonal	Interpersonal
Reserved, aloof	Needs , friendship
Experimental	Conventional , traditional
Generate own hypotheses	Influenced by the salient features
Acquires information to fit conceptual schema	Acquires unrelated facts
Insensitive to social undercurrents	Sensitive to others
Interpersonal orientation	Factually oriented

(From Jonassen & Grabowski, 1993, p88)

7. Field Dependence-Independence Measurement Tools:

At first, an individual's propensity to use either visual or vestibular signals in the perception of the upright was historically evaluated with The Body-Adjustment Test (BAT), The Rod-and-Frame-Test (RFT) and the Embedded Figures Test (EFT). (Witkin & Goodenough, 1981). Riding and Rayner (2000) provide description for the different FDI measurement tools.

1.7.1. The Body-Adjustment Test (BAT)

For the BAT, Riding and Rayner (2000) say that the attempt has been made to recreate the conditions faced by pilots in low cloud flying aircraft. Thus, subject is seated in a small, specially built room, where both the chair and the table can be rotated clockwise and clockwise independently of each other, and the role of the subject is to move the chair to the position where it is perceived as upright. The persons who experience their own bodies as upright when completely aligned with the surrounding titled room are described as field holding the body

more or less upright, are known as field dependence.

1.7.2. The Rod-and-Frame Test (RFT)

For the RFT, which is a further version of the previous test, the alternative visual structure is a luminous square frame displayed to the subject in a totally darkened room. The frame can be rotated clockwise and counterclockwise around its center. Pivoted to the same center is a luminous rod which can independently be rotated clockwise and counterclockwise of the frame. The frame and the rod, shown in angled positions, are both things the subject can see in the darkroom. Once, the aim is to place the rod in a truly upright position. Subjects that tend to match the rod with the orientation of the frame are believed field dependency, while subjects that disregard the tilt of the frame tend to approximate the true upright are believed field (Riding & Rayner, 2000).

1.7.3. Embedded Figures Test and Group Embedded Figures Test

All the above three measures are time-consuming and expensive. It is currently conceived from this earlier design, at least with the perceptual domain, as the ability to dismantle data from within a complex field. Since then, many much less complicated test instruments have been created such as the Embedded Figures Test (EFT) and Group Embedded Figures Test (GEFT) (Witkin, 1950; Witkin et al., 1971). For EFT and GEFT subjects are provided with a series of paper and pencil problems, each involving a simple geometric figure and a complex design that is so patterned that each portion of the simple figure is part of a planned sub-cut pattern; the simple figure is efficiently concealed thereby. FI people are able to quickly define the simple figure from the complex design while FD people are unable to recognize the simple figure within the search time required.

Moreover, preschool's (for ages 3-5) and children's (for ages 5-9) embedded figure test models as well as the embedded figure test model for teenagers and adults are also formed to assess the field disposition (see Witkin et al., 1971). The previous three tests can be summarized as following:

1. The Embedded Figures Test (EFT): a 12-item test, consisting of two sets of cards each

depicting complex figures and simple figures respectively.

2. Children's Embedded Figures Test (CEFT): a 25-item, individually conducted test that incorporates a series of simple and complex figures, and incomplete pictures demanding the subject to disassemble or identify embedded shapes. The test was usually referenced for children aged between 5 and 12 years (Witkin et al., 1971).
3. Group Embedded Figures Test (GEFT): a group-conducted, 25 item test for adults in which the structure is very similar to the EFT (Witkin et al., 1971).

Witkin contended that efficient performance in all these tests demanded the individual to 'disembed', to dissect and differentiate simple figure from its context, and he distinguished field independence as an "articulated field approach" and compared it with "global field approach" (Witkin & Goodenough, 1981).

Witkin & Goodenough (1981) state that these opposing traits are thought to influence cognitive as well as social habits and abilities. Field independence is correlated with stronger articulation and cognitive examination and restructuring abilities, and field dependence with a global perspective and stronger social and interpersonal skills. Any style can have benefits or pitfalls for a given task.

8. Student-Teacher Field Independence-Dependence Match and Mismatch

Since teacher-students' cognitive style is regarded as a potent educational component, numerous researchers investigate the learning and interaction effects of student-teacher stylistic match or mismatch.

It is of great import to notice that a match denotes to supplying varieties of teaching comparative to the student's capability to profit from them; or else, instruction turn out to be a hindrance and disconfirmation, which suppresses learning (Hunt, 1970).

Most scholars who are investigating this field have demonstrated an inclination for matching student-teacher cognitive styles which might aid students' learning, assuming that FI students will achieve more efficiently when matched with FI teachers and FD students will

achieve more efficiently when matched with FD teachers (McKenna, 1990). Coupled with such assumption, many studies attempt to validate it.

DiStefano (1970, as cited in. Zhang & Sterberg, 2002) examines the interaction influences of student-teacher FDI match and mismatch by utilizing a sample of students and teachers in a systematic classroom condition. He finds that students and teachers matched to one another in style incline to look positively to each other. Conversely, students and teachers with opposing cognitive style incline to look negatively to one another. Correspondingly, findings comparable to those of DiStefano (1970, as cited in. Zhang & Sterberg, 2002) has been detected by other researchers (Gaeta, 1977; James, 1973). For instance, James (1973) establishes meaningfully superior interpersonal desirability in matched than in mismatched student-teacher grouping, mentioning that teachers incline to allocate greater scores to those students who have cognitive styles like theirs. Consequently, these inquiries indicating student-teacher match in cognitive style make for superior interpersonal desirability than mismatch. Witkin et al. (1977) assume, it was likely that that teachers' greater assessment of students comparable to them in cognitive style may have reflected greater student achievement and teachers may definitely perform greater with students comparable to themselves in style.

However, the match-mismatch influences dissimilar findings are detected. For instance, Hansen and Stanfield (1982) suggest that the FDI cognitive styles of both student and teacher match or mismatch creates no substantial influences on foreign language performance. They claim that solely once the information were re-investigated, did the findings represent that FD males with the FD teacher achieve higher than FD males with FI teachers, whereas FI females with FI teachers achieve higher than FI females with the FD teachers. Correspondingly, Witkin et al. (1977) investigation on the match of student-teacher cognitive style influences did not demonstrate the predictable match-mismatch influence of student-teacher cognitive; rather, they detect a match-mismatch concerning student-teacher sex. Further, Saracho and Dayton (1980, as cited in. Zhang & Sterberg, 2002) and Hayes and Allinson (1997, as cited in. Zhang

& Sterberg, 2002) show that the hypothesis of cognitive style matching miscarried in a specific manner. Their investigations findings present a substitute hypothesis that FI students profit from the match of cognitive style and FD students profit from the mismatch of cognitive style.

To sum up, it is obvious from the data available regarding student-teacher cognitive style match and mismatch that there is a debate concerning its efficiency on both student and teacher. Thus, it is of great importance that data gathered from such hypothesis should be well investigated to reveal its positive or negative effect on teaching learning process.

9. Cognitive Style and Vocational Decisions

Witkin et al. (1977) examine the inclusion of cognitive style, particularly Field Dependence Independence dimension in vocational development. A few years later, Messik (1984) stresses the latent involvement of cognitive style to enhance career decision making and orientation. It is due to the bipolar or unbiased estimate quality of Field Dependence-Independence and that it is a quality that has no positive or negative concept linked to it unlike capacity, that present it as probable factor to use in recommending cases (Messik, 1984; Witkin et al., 1977). Thus, all educational participants will assess cognitive style inclusion in vocational choices with more freedom as it has less threatening (Frank, 1986). According to Frank (1986), field independent persons are “task-oriented, analytical processors of information” (p. 19) while field dependent persons are “socially oriented, global processors of information” (p. 19).

Witkin et al. (1977) think that the association between Field Dependence – Independence and career/ academic choices lies in what cognitive capacities and personality traits a field of training includes. In other word, field dependent persons preferring fields that deal with restructuring abilities as well as dissection, coupled with less amount of interpersonal communication like: Science. Comparatively, field dependent persons would like to avoid restructuring and analytical task and opt for fields that has interpersonal contact like: Humanities. These claims has been boosted through many studies (Holtzman et al., 1971; Witkin et al., 1977, as cited in. Frank, 1986). For instance, Witkin et al. (1977) find out that

majors in science were attributed more to FI than majors of education and some fall amid. Further, Sofman et al. (1976, as cited in. Frank, 1986) reveal that science teachers were more FI than liberal arts teachers. Finally, it is evident that field dependence independence cognitive style is a significant factor that likely impact vocational choices.

2. Educational System in Algeria and Academic Streams

This section sheds the light on the history and the development of the educational system in Algeria and its nature from the primary to college level. Correspondingly, it tackles the nature of the general secondary education with a chief emphasize on the academic streams. Finally, this section deals with the status of English in Algeria.

1. History & Nature of Educational System in Algeria

It has been argued that there have been various reforms that have affected Algeria's education system. Such changes tend to have more emphasis on increasing the quality and the effectiveness of schooling. Clarck (2006) states that is very important to discuss the chronological development of the educational system, starting with the curricula adopted and the socio-political changes observed. In fact, the suggested reforms tackle common concerns and particular issues such as improving teaching efficiency, implementing curricula, and organizing the school environment. Education in Algeria is founded by the Algerian government and categorized as public institutions (Clarck, 2006). Accordingly, Mundy et al. (2016) claim that the educational system of today is distinguished by the fact of having globalized perspectives because the designed aims particularly attempt to serve the systems that are unified under common objectives, and which aim to prepare productive learners and citizens. The Ministry of National Education is responsible for the supervision of basic and secondary education.

The educational system in Algeria is divided into four levels: primary, lower secondary, upper secondary, and college. Primary education in Algeria lasts a total of nine (9) years, five years (5) of primary school and four (4) years for lower secondary education. Most students are taught in public school, pupils take English class from the first grade of the middle school. At

this time, pupils would be 11 years old on average. Pupils must take exams for the Brevet d'Enseignement Moyen (BEM) certificate for the round of this 9-year term. Pupils who pass the BEM exam can opt for: general secondary education or secondary vocational education.

2. General Secondary Education and Academic Streams

Upper secondary education is called the lycée. During the first year of upper secondary education, pupils will have to select *a general range of subjects (tronc commun)*, whereas they will have to choose a profile in *the arts (literary)* or *in science and technology (scientific)*. They will continue their specialisation in their 2nd and 3rd year. *The arts profile* offers a choice of specialisations in: foreign languages or arts and philosophy. *The science and technology profile* offers a choice of specialisations in: management and economics, natural sciences, mathematics and technical mathematics (Clarck, 2006).

3. The Status of English in Algeria

Algeria's Ministry of Education grants a lot of importance to the use of English language and has supported teaching and learning foreign languages. After independence, Algeria started to establish an educational system that is supported high quality of teaching and learning, where the issue of effective teaching is seen as a move that leads to well developed and improved achievement using the valuable outcomes that are necessary for their future success (Coe et al, 2014, as cited in. Acheb, 2019). In this regard; English has been taught at high school for seven years, from the first year in middle school to their last year at secondary school. English is used primary as a language is taught as a branch of study. Sometimes it is used as a supplementary module in different modules such as Physics, Biology, Economics, and Sociology.

3. Cognitive Style and Academic Achievement

The construct of cognitive style has been addressed as a promising variable that may justify the distinctions noticed among students' academic achievement on different disciplines and supply us with a better understanding concerning student achievement. Many studies ascertain cognitive style as a critical factor that may influence students' achievement across many

disciplines and on different school subjects (see, Murphy, Casey, Day, & Young, 1997; Cakan, 2000). Additionally, Lees, et al. (1963, as cited in. Musya, 2015) infer that field-independent learners have a preference over field-dependent learners concerning learning analytic notions, while field dependent learners have the preference when it is related to learning inferential or relational notions. Witkin and Goodenough (1981) investigate studies indicating that field independent learners achieve better in particular areas of the curriculum like mathematics, the sciences, engineering, and other analytical fields. In contrast, Field-dependent learners, apparently achieve better in curriculum areas that have a social values emphasis.

1. Definition of Achievement

Academic achievement is considered as a key criterion for assessing one's total potentiality and capability (Jayakumar & Surudhi, 2015). Moreover, it is regarded in many academic settings as the grade point averages of students; therefore, occupies an important place in education as well as in the learning process. Correspondingly, academic achievement denotes the knowledge gained and the skills developed in the subject, which are usually designated by test scores (Jayakumar & Surudhi, 2015). Accordingly, Jayakumar and Surudhi (2015) identify the term "achievement" as "accomplishment or proficiency of performance in a given skill or body of knowledge" (p. 5496). In this highly competitive world, Academic achievement has become an index of students' future.

Simpson and Weiner (1989, as cited in. Razali & Alam, 2015) define achievement as measurable behavior in a standardized test sequence. Parallel to the definition, Bruce and Neville (1979) advance the notion that academic achievement is assessed by standardized test of achievement developed for faculty subjects. Hence, in this context, scholars seem to accept that the test should be standardized and accurate for a period of time. Further, achievement is viewed as an action of accomplishing by effort. In the sense of education, achievement test attempts to measure systematic education and training towards a conventionally recognized skill or knowledge (Simpson & Weiner, 1989, as cited in. Razali & Alam, 2015).

2. Cognitive Style (FDI) and Academic Achievement Across many Fields

Field dependence-independence cognitive style is found to have a significant effect on many disciplines. Thus, the below explanations deal with such effect on mathematics, natural sciences, social sciences and concluded with the impact of such cognitive style on many other disciplines.

3.2.1. Cognitive Style (FDI) and Academic Achievement in Mathematics

Witkin et al (1977a) argue that the association between FDI and mathematics has gained a great deal of interest, due to that mathematics is viewed as a task that required a high stage of restructuring and disembedding capacity. Indeed, data from investigations dealing with wide-ranging ages that analyzed the association of such tests with insightful disembedding test have shown this. In these, constantly higher capacity is stated in field independent subjects contrasted to field dependent subjects (see for example Frank, 1986; Roberge & Flexer, 1983; Ronning, McCurdy, & Ballinger, 1984; Roszkowski & Snelbecker, 1987; Vaidya & Chansky, 1980), a supremacy that is sustained when the impacts of intelligence are separated (van Blerkom, 1988). The same propensity likewise arises in those investigations where school marks are utilized as a guide of output (Bowlin, 1988; Mroska, Black, & Hardy, 1987; Paramo & Tinajero, 1990, 1991). To conclude, , it has been noticed that field dependent subjects are inferior than field independents at resolving mathematical problems (Roberge & Flexer, 1983; Testu, 1984; van Blerkom, 1988) corresponding with the troubles the formers have to solve problems in general.

3.2.2. Cognitive Style (FDI) and Academic Achievement in Natural Sciences

Natural sciences appeal little attention than the other fields, even at preceding educational stages in which scientific intellect and problem-solving are called for. A considerable number of inquiries have claimed higher achievement by field-independent subjects in these areas (Arthur & Day, 1991; Frank & Noble, 1985; Linn, 1978; Strawitz, 1984a, 1984b), which is assigned to their utmost restructuring capacity. Further, it appears feasible to anticipate that these subjects should demonstrate higher achievement in those school systems including within the set of natural sciences, as biology, physics, chemistry, etc.

Disembedding and restructuring capacities are ordinarily inferred in the diverse method field dependent and independent subjects resolve problems generally (Frank & Noble, 1985; Roberge & Flexer, 1983; Robertson & Alfano, 1985). Another inquiry, by Ronning et al. (1984) is correspondingly illustrative. They examined scientific problem solving through high-school learners. Regression examination point out that FDI was a substantial difference source in the problem--solving mark, whether or not between-subject variances in aptitude were regarded. Whilst the sessions of problem-solving, the learners had been questioned to orally label any thoughts that arose to them, and the sessions had been recorded. Inspection of records designated that the “thought labelling” of field-dependent subjects were shorter than those of field-independent subjects; yet, the latter were much to the point, and proposed more operative discernment between relevant and irrelevant data and more operative way out to prior experience.

3.2.3. Cognitive Style (FDI) and Academic Achievement in Social Sciences

Research of achievement in the social sciences ascends from diverse hypotheses than those relating to research in other areas. Unlike the higher anticipated achievement of field-independent subjects in mathematics, natural sciences and language, the origins of the Differentiation Theory drive one to suppose that field-dependent subjects will be eminent in social sciences. Witkin et al. (1977a) raised this question based on two sorts of evidence. On the one hand, the supremacy demonstrated by field-dependent subjects in assignments encompassing the memorizing and the subjects learning with a social substance (Fitzgibbons & Goldberger, 1971; Goodenough, 1976).

Some investigations which have explored the association between FDI and performance have generally resulted findings which contend against Witkin’s statement. Satterly (1979) and Roszkowski and Snelbecker (1987) observed nine- to eleven-year-old children, and both found that field dependence was linked with weak achievement on consistent social science tests (though their findings varied regarding the influence of intelligence). Satterly’s research (as

cited in. Tenajero & Pàramero, 1998) involves an aspect analysis: this shown a cognitive style aspect which was autonomous of intelligence. In Roszkowski and Snelbecker's (1987) research, on the other hand, fractional correlation analysis specify that FDI had no significant impact on performance test while intelligence was considered. It is ought to indicate that while Satterly employed a test which scale achievement in Geography, Roszkowski and Snelbecker recorded global achievement in Social Studies. It is possible that achievement in Geography tests, require the restructuring capacity than History or Economics, bigger variances with consideration to field dependent-independent subjects' achievement.

On the other hand, with older subjects the findings differ. In inquiry of 10- to 14-year-old children, utilizing school marks for social sciences (Paramo & Tinajero, 1990), they find out that field-independent subjects achieved better than field-dependent subjects in the group aged between 12 and 14 but not in the group aged between 10 and 11. Comparable investigations with high school children show that field-independent subjects achieve better on consistent social sciences tests (Bowlin, 1988; Dubois & Cohen, 1970). In the view of such conclusions, it may considered a potential age variation or the course in connection between the FDI with achievement in Social Sciences.

3.2.4. Cognitive Style (FDI) and Academic Achievement in Different Disciplines

The impact of FDI cognitive style on academic achievement has covered many other disciplines. In an investigation study, Dwyer and Moore (1995) examine the influence of cognitive style on achievement with 179 students from two universities in the United States who have registered in an introductory education course. They find out that field independent students to be better to field dependent learners on tests scaling various educational objectives. The researchers then, deduce that cognitive style has a significant relationship with students' academic achievement. Similarly, Murphy, Casey, Day & Young (1997) study on the relationship between cognitive style and academic achievement of 63 undergraduate Canadian students in information and management program find out that field independent students

outperform their field dependent peers in one technical course while for the other three courses, the two groups were found to perform similarly.

Furthermore, Verma and Swain (1991) study on the impact of cognitive style on scholastic achievement reveals field independent students to obtain significantly higher scores than their counterparts of field dependent students in English, Mathematics, General Studies, Social studies and Drawing individually or in terms of groups. Further, Kirk (2000) explores the correlation of cognitive style with academic achievement in chemistry and found that field independence cognitive style was significantly related to academic achievement. Kumar (2006) finds out that tribal and non-tribal students of 12th grade varied significantly with relevance to field dependence-independence cognitive styles. Non-tribal students were found more field independent than tribal students. Geetanjali (2006) stresses that cognitive styles had a crucial influence on a student's academic achievement. He claims that the more field independence was delivered to the students, the higher became the academic achievement. In experimentations that aim to elaborate differences in achievement between field independent (FI) and field dependent (FD) persons, Rollock (1992) study detects that FI learners, when confronting with a restricted amount of unambiguous assignment relevant information, will often outdo their FD learner counterparts. Tinajero and Paramo (2010), Linder (2011), Nicolaou and Xistouri (2011) and Wei and Sazilah (2012) among many other researchers who demonstrate the enormous impact of cognitive styles on academic achievement. Reversely, in controversial findings of the studies conducted by Altun and Cakan (2006) and Ipek (2010) fail to realize any vital influence of cognitive style on achievement. Calcaterra, Antonetti and Underwood (2005) and DeTure (2004) find out from their research that there was no significant influence of cognitive styles on learning results and that it was a deprived success predictor in learning.

To sum up, most studies confirmed the supremacy of FI learners over their counterparts of FD learner. Davis and Cochran (1989) point out that research mostly demonstrates that field

independent learners, reveal higher levels of achievement than field dependent learners do. Correspondingly, Muhammad (2001, as cited in. Musya, 2015) indicates that learners with field-independent cognitive style achieve academically higher than learners with field dependent cognitive style.

3. Cognitive Style (FDI) and Academic Achievement in Language

Language establishes the fundamental element of human communication and the chief basis of overall educational activities. All through the world, the acquirement of both communicative and comprehensive competencies of the official language(s) in the state is rendered vital prominence in the school curriculum. In general, one or further second languages are as well instructed. Research of the association of FDI with language achievement at school have regarded both official as well as second languages (Tenajero & Pàramero, 1998). Below, at first the discussion of the relevant investigations of official languages achievement, and after switch to investigations of other languages

3.3.1. Cognitive Style (FDI) and Academic Achievement in Official Languages

In this field of research, consideration has converged on the probable impact of FDI on learning reading. Some researchers (Buriel, 1978; Satterly, 1976) propose that field-independent subjects, in assessment of their superior disembedding capacity, might get it simpler to recognize distinct linguistic elements within greater ones. Certainly, this hypothesis is reinforced by information which demonstrate that field-independent subjects achieve higher than field-dependent subjects throughout the initial phases of learning reading. Davis (1987, as cited in. Tinajero & Pàramero, 1998) examines the outcomes of numerous inquiries of pre-school and primary school children. Davis states that the degree of correlation was lesser while the directory of FDI was the RFT than when it was the Children's Embedded Figures Test (CEFT; Karp & Konstadt, 1971) or the Preschool Embedded Figures Test (PEFT; Coates, 1972), signifying that the detected association was basically because of the disembedding constituent of FDI.

With rising educational stage; the association of FDI with reading capacity deteriorates; contradictory results have been gotten both concerning the influence of FDI on reading capacity and the effect of intelligence on this association.

For instance, Burton and Sinatra (1984), implement audiovisual procedures to examine vocabulary acquirement by preschool children with FDI is assessed by the CEFT. As anticipated, all children remember a greater amount of words. Field-dependent subjects remember lesser words than field-independent subjects in both presentation styles. These outcomes propose that rising the degree of variation between the words offered is of low assist to field-dependent than to field-independent subjects, perhaps due to that field-dependent subjects are lesser skilled at recognizing the pertinent distinctive features. The outcomes of such studies hence, propose that the disembedding constituent of FDI is a significant moderator of the learning of reading skills, specifically through the initial levels while the aim is to recognize components of the writing system. It looks probably, as proposed by researchers comprising Davey and Menke (1990) and Davis (1991) that the effect of FDI on reading capacity progressively minimizes as the capacity turns into more automatic.

Not all inquiries of the association between FDI and capacity in the official language have focused on reading; for instance, different researchers have viewed at control of grammatical rules. Many researchers claim that field-independent subjects achieve higher in particular sorts of grammar assignment and, once more, that this might be much assignable to the requirements of disembedding and/or restructuring concerned in the assignment implemented to assess linguistic product than to the knowledge stage of the subject. Hence, Aubret (1986, as cited in Tinajero & Pàramero, 1998), who implements doze tests, contends the stance that in this sort of test a particular flexibility is substantial to accept or refuse optional content representations of the text (in the case of requiring to count on the text meaning to speculate the lacking words), or the syntactical structure analysis (in the case of having to count on this); both needs might be regarded as techniques restructuring. Given that in his inquiry no variations were gained in

the texts raised with consideration to the year in which the learners were learning, and that they were gained concerning cognitive style, the researcher deduced that cloze tests are not a valid indicator of grammar.

Knowledge/understanding, but that in state they would invert between-subject variations in the style of linguistic processing. Roszkowski and Snelbecker (1987, as cited in. Tinajero & Pàramero, 1998) utilize assignments comprising of errors recognition in a text; they deduced that test scores inverted not simply variation in grammatical rules knowledge, but in capacity to disembed irregularities as well. Bialystok (1992) utilizes assignments consisting of the grammatical correctness assessment of a set of phrases. Field-dependent subjects are apt to recognize phrases which are semantically ridiculous (although grammar was correct) as incorrect; in the opinion of the researcher, this outcome inverts the higher degree to which field-dependent subjects are "distracted" by semantic ineptitude. Eventually, a significant amount of inquiries examine the association between FDI and global achievement in the official language, as scaled by integrated tests or school scores (Dubois & Cohen, 1970; Renninger & Snyder, 1983; Rodrigues, 1986; Paramo & Tinajero, 1990, 1991). All these inquiries infer that field-independent subjects achieve higher. Ultimately, though findings until the present time at first seem to denote that school accomplishment of field independent subjects in the official language is higher than that of field-dependent subjects, this supremacy seems to rely on the particular language skill regarded and on the disembedding and/or restructuring capacity which that skill requires.

3.3.2. Cognitive Style (FDI) and Academic Achievement in Second Language

It is assumed that field independence as well as field dependence may have affirmative impacts on second-language acquisition (SLA). On the one side, it is indicated that the superior restructuring capacity of field-independent subjects prefer to acquire and apply the linguistic rules (Abraham, 1983) and the effective implementation of communal classroom tasks like cloze tests (Chapelle & Roberts, 1986; Hansen & Stanfield, 1981). On the other side, it is

indicated that the interpersonal abilities of field dependent subjects prefer second language acquisition, mainly when this is done over communication with native speakers (Brown, 1987; Chapelle & Roberts, 1986; Hansen & Stanfield, 1981). Moreover, Brown (1987) induces the mobility- fixity notion (Witkin & Goodenough, 1981), signifying that the basis to learn second language effectively exists in “mobility”, that is, in being capable of drawing on the “best” features of the two styles, hence permitting ideal adaptability to the learning setting.

All investigations until the present time emphasize on the association of disembedding assessments with school assessments of second language acquisition-linked abilities (conversation, reading, writing, etc.) or standardized assessments like the Test of English as a Foreign Language (TOEFL). Samples contain learners in their particular country, learners joining rigorous courses in the country of the language to be learnt, or emigrants learning the host country’s language. In overall circumstances the findings have designated that field-independent subjects achieve higher.

Skehan (1989, as cited in Tinajero & Pàramero, 1998) states that the learning capacity of the second language inverts a range of particular capacities, that is, firstly, “phonetic coding”, namely, the capacity to discriminate between phonemes, to compose sets with them and with the conforming transcribed symbols, and to remember these sets, secondly, the capacity to incorporate data received and to register it as an independent unit, and lastly, language analysis capacity, namely, the capacity to identify the grammatical roles of words in phrases, and to deduce the rules of grammar based upon the received input of the language. Chapelle and Green (1992, as cited in Tinajero & Pàramero, 1998) claim that language analysis capacity is firmly attached to insightful disembedding capacity as scaled by tests like the EFT, and this might fully clarify the superior SLA capacities of field independent subjects.

This interpretation gets on well with the notion that field-independent subjects’ abilities prefer SLA. Nevertheless, the possible preferring influence of the interpersonal capacities of

field dependent subjects have to be tested; maybe in non-formal setting of learning, in contact with native speakers, these would act identically as or higher than field-independent subjects.

To sum up, Field Independence also affects the English language learning. Studies show that field independent learners perform better than field dependent in learning English language (Abraham, 1985).

As the findings of many earlier studies indicate, students' cognitive style has a positive significant relationship with their academic achievement across many disciplines with field independence students predominantly outperform their counterparts of field dependence students.

However, despite all the studies done on the relationship of students' cognitive style with their academic achievement, cognitive styles in EFL classrooms have not received the due attention and scrutiny to uncover the patterns by which EFL students' field dependence/independence cognitive styles and their former academic stream influence their academic achievement.

Summary

The next chapter represents the practical part of the present study. It deals with research methodology and findings discussion. Further, it will demonstrate the framework of the study in terms of the method used, data collection and statistical tools, participants and setting, and procedures of the study. Ultimately, the next chapter will provide data analysis as well as interpretations and discussion of the findings with recommendations and pedagogical implications.

CHAPTER 2

Methodology, Data Analysis and Pedagogical Implications

Introduction

1. Research Design and Data collection Tools

1.1 Method

1.2 Setting and Participants

1.3 Research tools

1.3.1 Cognitive Style Questionnaire (CSQ)

1.3.2 Teachers' Interview

1.4 Statistical Tools for Data Analysis

1.5 Procedures

2. Data Analysis & Interpretation

2.1 Data Analysis of Research Question One

2.2. Data Analysis of Research Question Two

2.3. Data Analysis of Research Question Three

2.4. Data Analysis of Teachers' Interview

3. Discussion

3.1. Academic Stream and Cognitive Style

3.2. EFL Success and Cognitive Style

3.3. Academic Stream and Academic Success in L2 learning

3.4. Teachers' Interview discussions

Conclusion

Introduction

The previous chapter dealt with the theoretical background and related literature on cognitive styles and academic achievement. Thus, setting the ground for the second chapter that is devoted for the field study. Chapter two describes the research design, sampling techniques and procedures the research has gone through, in addition to the data analysis and discussion of the results obtained. This chapter is comprised of two sections. The first section supplies a complete description of the methodology and procedures of the study. Chiefly, it provides the explanation of the overall research design. Afterwards, the pilot study, the sample, the setting and the research tools. Ultimately, this is followed by the data procedures of data collection. While, the second section tackled the analysis of obtained data and the discussion of the findings on the light of related research. In order to supply an answer to the research questions, a statistical analysis for each is fulfilled to demonstrate the findings realized from this study.

1. Research Design & Data collection Tools

Research design is “a plan that describes how, when and where data are to be collected and analyzed” (Parahoo¹, 1997, p. 142). In other words, it is a framework or strategy that plans how the research study will be conducted comprising when, where from whom where and under what circumstances the data will be obtained and analyzed. The purpose of this research is to examine the relationship of EFL learners’ field dependence-independence cognitive styles and academic streams with their academic achievement as well as EFL perception and implementation of cognitive style. Hence, to realize this aim, specific methodological decision were taken regarding the research method, tools, sample selection and research setting that are illustrated in the first section of this chapter.

2. Method

To assess the hypotheses and realize the objectives of this study, a causal-comparative research design is adopted. Causal comparative designs are a form of ex post facto inquiry. Gall

et al. (2007) identified ex post facto inquiry as “designs that rely on observation of relationship between naturally occurring variations in the presumed independent and dependent variables” (p. 306). The causal-comparative design was selected for the study because it permitted the researcher to look at data that was already obtainable and decide the cause and effect relationship between the data based on manipulated variables.

3. Participants and Settings

This study occurred at the English language department in M’sila University, it was proceeded just after the first semester exams of the academic year 2019/2020. Due to Covid-19 pandemic, this study was conducted during the phase from January to August.

The population from which the sample was drawn comprised Master 2 EFL students majoring in English language, both Linguistics and Literature & Civilization specialties at M’sila University. They studied English for seven (7) years before majoring it at the university both in middle and secondary education levels and five (5) as a specialty at the college. The total numbers of participants is 60 students and 5 EFL teachers.

The 60 participants were distributed based on the stages of the study. At first, for investigating the validity, reliability and usability of Cognitive Styles Questionnaire (CSQ), 12 of Master 2 participants were selected randomly, six (6) of Linguistics and six (6) of Literature & Civilization participants from M’sila University. To explore the FDI cognitive styles inclination and academic streams of Master 2 participants at M’sila University, forty eight (48) of them were selected randomly, twenty four (24) of Linguistics and twenty four (24) of Literature & Civilization participants were subjected to online CSQ due to Covid-19 pandemic and they were classified into two sets; field independent and field dependent participants. The overall number of participants at the final phase were thirty seven (40), nineteen (22) FI and eighteen (18) FD participants.

To examine the cognitive styles’ awareness and implication of EFL teachers, 5 EFL teachers in M’sila University were randomly selected to be interviewed.

For the sampling techniques adopted in this study, only simple random sampling was used. Firstly, the list of Master 2 students was provided from the administration. Sixty (60) of Master 2 linguistics and Literature & Civilization students were randomly selected using simple random sampling. Twelve (12) of the overall sampling were selected randomly for piloting the cognitive style questionnaire using the simple random sampling through lottery method. Moreover, the remaining participants (48 participants) were subjected to CSC questionnaire and were grouped into two groups. Ultimately, the received questionnaires were forty three (43), three (3) of them were rejected for incompleteness issues. The overall number then is forty (40) participants. Then, they have been grouped into 18 FD students and 22 FI students, 23 scientific and 17 literary students.

A simple random sampling was adopted again to select five EFL teachers at M'sila University through lottery method. Overall, the following table 04 is a summary of the selected sample.

Table (04): Participants Distribution through the Different Phases of Investigation

	Total Number of Participants			
	The Pilot Study	1st Stage of Investigation	2nd Stage of Investigation	
			FD	FI
Number of Students	12	48	20	20
%	20	80	30	36,66

4. Research Tools

In this study, two (2) research tools were used. Firstly, the Cognitive Styles Questionnaire (CSQ) to investigate FDI cognitive styles inclination and academic streams of Master 2 students (see **Appendix 02**), and an interview that was designed for EFL teachers to examine their cognitive styles awareness and implications.

1. Cognitive Style Questionnaire (CSC)

The present study used the Cognitive Styles Checklist (CSC) developed by a University professor, Robert Wyss (2002) in his work on Field dependence/Independence and the L2 learning. For the present study, this tool was modified, adapted and revalidated for utilization in investigating Master 2 students' cognitive styles. Thus, the CSC is comprised of the personal information of the participants as name, group and academic stream at high school; literary or scientific stream. Besides, it encompassed 9 statements for each of the two cognitive styles (Field Dependence or Field Independence) which were utilized to measure the participants, preferences for each cognitive style dimension. The highest score in field dependence/independence is 27. The highest scores between the two dimensions (FD/FI) indicated strength or tendency to that cognitive style. The lowest score is 9, which indicate that the student is not tended to either field dependence or field independence cognitive dimensions.

4.1.1. Validity of the Tool

While the tool was a published one as the study used field independence/dependence questionnaire by Robert Wyss (2002), validity issues were assumed. In addition, this tool was used in pilot study on EFL students at M'sila University to strengthen its validity.

2. Teachers' Interview

Since one of the ultimate aims of this study is to explore EFL teachers' awareness and implication of cognitive styles, then it is crucial to interview them to gain a relevant and in-deep understanding of their conceptualization of cognitive styles and their relationship with L2 context.

The interview (**see Appendix 02**) is comprised of six (6) compounded questions that encompass both open-ended and close-ended questions. The overall questions seek to explore EFL teachers' perception of the different individual differences generally and cognitive styles specifically that effect L2 learning and the way they assess them, their awareness of their own

as well as their students' cognitive styles and how they influence each other in L2 learning and achievement, how to raise students' cognitive styles awareness and its impact on L2 learning and the influence of the academic streams on secondary school on shaping students' cognitive styles and their reflection on L2 learning and achievement. This interview was dedicated to five (5) EFL teachers at M'sila University using telephone method due to Covid-19 pandemic.

The interview was raised based chiefly on reading and analyzing the related literature on cognitive styles and its relationship with learning and academic achievement, supervisor's counselling and the results of the pilot study that was conducted before the main study to examine EFL teachers and students awareness of cognitive styles at English department in M'sila University.

3. Statistical Tools for Data Analysis

The statistical tools adopted for data analysis in this study are: Pearson's Chi Square and the Phi (ϕ) correlation coefficient tests. All such statistical operations were carried out using SPSS, version 20 for Microsoft. To illustrate things, the following definitions are provided to explain these statistical tools.

- **The Chi Square test** (χ^2) is widely used to evaluate relationships between categorical variables. The null hypothesis of the Chi-square test is that there is no relationship among the population of categorical variables; they are independent.

The calculation of the Chi-square statistic is quite straight-forward and intuitive, its formula

is:
$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where "O" is the observed value, "E" is the expected value and the subscript "c" are the degrees of freedom

- **The Phi Coefficient test** (ϕ) is a measure of association between two binary variables. It is also called the Yule Phi or Mean Square Contingency Coefficient and is used for Contingency tables when at least one variable is nominal.

Its formula of calculation is:
$$\phi = \frac{ad - bc}{\sqrt{efgh}}$$

4. Procedures

To realize the objectives and assess the hypotheses of the present study, several procedures have been adopted. Initially, to evaluate the validity, reliability and usability of the cognitive style questionnaire of Wyss (2002) on the target population on this study, 12 participants were selected randomly from Master 2 EFL students of both majors; linguistics and Literature & Civilization for pilot study. Later, after receiving feedbacks from the findings of pilot study, the CSQ was adjusted to conform the study purpose as well as participants. Next, the sample was drawn randomly using lottery method from Master 2 EFL students. It comprised of 48 participants. Due to Covid-19 pandemic, this sample were subjected to CSQ online. Consequently, we received only 43 questionnaire, 3 of them were rejected. Later, we obtained Master 2 scores list of the first semester from English department. On the other hand, to assess EFL teachers' perception of cognitive styles and their effects on L2 teaching-learning process, 5 EFL teachers at M'sila University were selected randomly through lottery method again to subject them to an interview. Due to Covid-19 pandemic again, teachers were interviewed through telephone using messenger application. Ultimately, the data gathered from the cognitive style questionnaire and students' scores were analyzed quantitatively using SPSS version 20 for Microsoft. Moreover, teachers' interview findings were analyzed qualitatively.

2. Data Analysis and Interpretation

The data obtained from the CSQ coupled with EFL students first semester scores to assess research hypotheses, were analyzed quantitatively using SPSS version 20 for Microsoft. Furthermore, data collected from EFL teachers' interview were analyzed qualitatively.

1. Data Analysis for Research Question One

In order to investigate research question one which deals with examining whether or not there is a difference of literary and scientific streams with EFL students cognitive style,

hypothesis one of that research question is assessed using inferential statistics supported with descriptive statistics.

Hypothesis 1: there is no statistically difference between scientific and literary streams and cognitive style.

Inferential statistics:

Chi Square test of independence has been used to test this hypothesis and the calculated values are demonstrating in the following table:

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4,639 ^a	1	,031		
Fisher's Exact Test				,053	,033
N of Valid Cases	40				

Table (05) Chi Square Tests of Streams and Cognitive Style

As the results of Chi Square test demonstrate, since the level of significance $P=0.031$ is less than 0.05 ($P=0.031$; $P>0.05$), then we reject the null hypothesis and accept the alternative one that says that there is a difference between the two groups. The statistically significant ($P=0.03$; $P>0.05$) of fisher’s Exact Test is again, a proof of the existence of an association between streams and cognitive style.

To confirm whether the association, emphasized by Fisher’s Exact Test, really occurs we used the Phi correlation coefficient test. The values of such test are presented in the following table:

	Value	Approx. Sig.
Nominal by Nominal Phi	,341	,031
N of Valid Cases	40	

Table (06): Phi Coefficient Test of Academic Stream and Cognitive Style

As it is clarified from the results in the table above, it is clear that both Phi and Cramer’s values are statistically significant as $p = 0.31$ which is less than 0.05 ($P=0.031$; $P>0.05$). Another

time, this is an evidence of the statistically significant difference between the stream and the cognitive style.

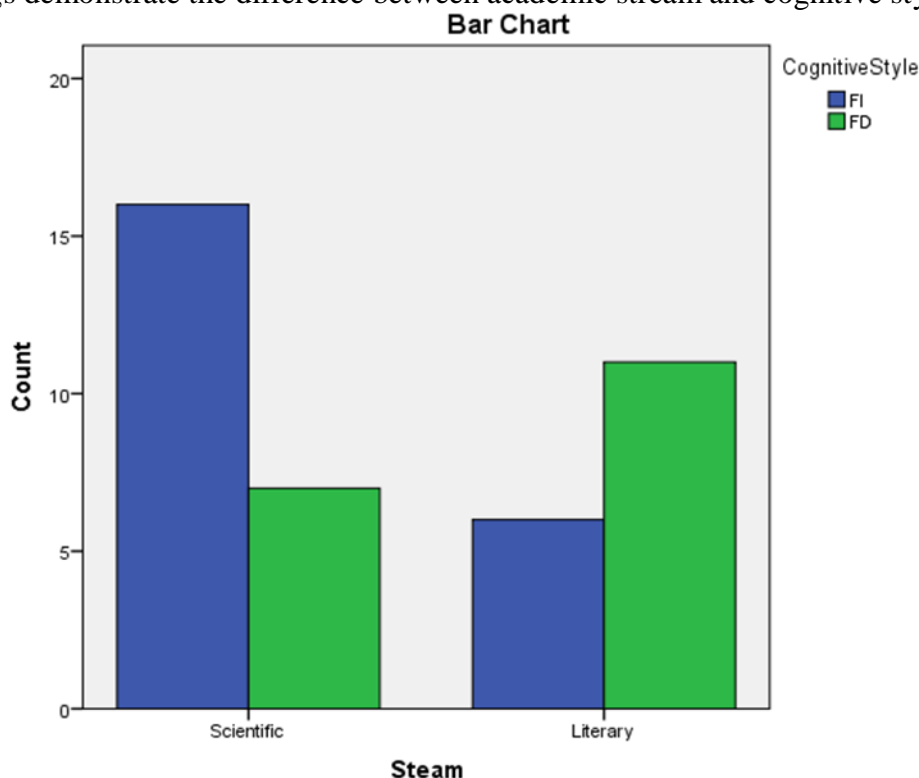
Descriptive Statistics:

For further clarification of these results, descriptive statistics using cross tabulation and graph (01) below clearly display the differences between the two groups.

			Cognitive Style		Total
			FI	FD	
Steam	Scientific	Count	16	7	23
		%	69,6%	30,4%	100,0%
	Literary	Count	6	11	17
		%	35,3%	64,7%	100,0%
Total		Count	22	18	40
		%	55,0%	45,0%	100,0%

Table (07) Stream and Cognitive Style Cross Tabulation Values

As it is presented in the cross tab above, it is obvious that 69, 6% of scientific participants were Field Independent and 30,4% of them are Field Dependent. Comparatively, 35, 3% of literary participants are Field Independent and 64, 7% of them are Field Dependent. These findings demonstrate the difference between academic stream and cognitive style.



Graph (01) Illustration of the Association of Students' academic Stream with their Cognitive Style

The above graph (01) displays the relationship of students' academic streams with their cognitive style. It is clear that scientific students are more Field Independent than their counterparts of literary students who tend to be more Field Dependent and the opposite. Scientific students are less Field Dependent when compared with literary students who are less Field Independent. The chart shows that, for Field Independence, sixteen (16) are scientific while only five (5) are literary students. On the other hand, for Field Dependence, only seven (7) were scientific while eleven (11) were literary students.

On the light of graph (01) and cross tabulation analysis, it is evident that there is an association between the academic stream and cognitive style. That is, most scientific students are FI, while most literary students are FD.

2. Data Analysis for Research Question Two

To investigate research question two which deals with examining whether or not there is a difference of successful and unsuccessful EFL students with their cognitive styles, hypothesis two of that research question is assessed using inferential statistics supported with descriptive statistics.

Hypothesis 2: there is no statistically difference between successful and unsuccessful EFL students in their cognitive styles.

Inferential statistics:

Chi Square test of independence has been used to test this hypothesis and the calculated values are demonstrating in the following table:

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,636 ^a	1	,037		
Fisher's Exact Test				,041	,055
N of Valid Cases	40				

Table (08) Chi-Square Test of EFL Success and Cognitive Style

As the results of Chi Square test represent, since the level of significance $P=0.037$ is less than 0.05 ($P=0.037$; $P>0.05$), then the null hypothesis is rejected and the alternative hypothesis is accepted. In other words, there is a difference between successful and unsuccessful EFL students in their cognitive style. Further, the statistically significant ($P=0.041$; $P>0.05$) of Fisher's Exact Test is again, a proof of the existence of an association between successful and unsuccessful EFL students and their cognitive style.

To check whether the association, stressed by Fisher's Exact Test, certainly exists we used the Phi correlation coefficient test.

	Value	Approx. Sig.
Nominal by Nominal Phi	,302	,047
N of Valid Cases	40	

Table (09): Phi coefficient test of EFL Success and Cognitive Style

The table (09) above demonstrate the Phi coefficient test of EFL Success and Cognitive Style. As it is shown, it is clear that both Phi and Cramer's values are statistically significant as ($P=0.047$; $P>0.05$). Another time, this is an evidence of the statistically significant correlation between successful and unsuccessful EFL students and the cognitive style.

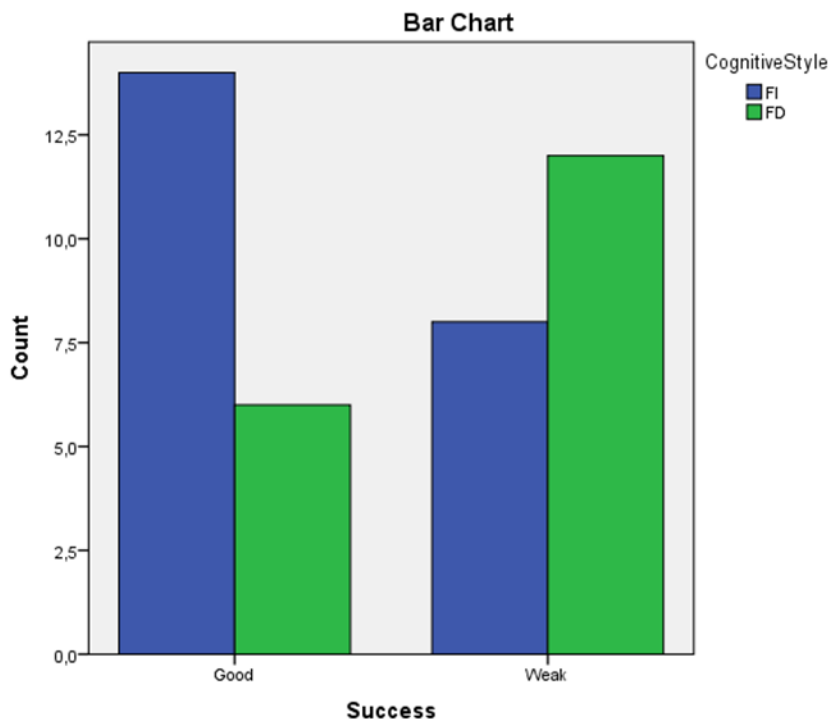
Descriptive Statistics:

For further clarification of these results, descriptive statistics using cross tabulation and graph (02) below clearly display the differences between successful and unsuccessful EFL students and their cognitive styles:

		Cognitive Style		Total	
		FI	FD		
Success	Successful students	Count	14	6	20
		%	70,0%	30,0%	100,0%
	Unsuccessful students	Count	8	12	20
		%	40,0%	60,0%	100,0%
Total		Count	22	18	40
		%	55,0%	45,0%	10,0%

Table (10) EFL Success and Cognitive Style Cross Tabulation Values

The EFL success and cognitive style cross tabulation above indicates that FI students are more successful than FD students and the opposite. Thus, 70,0 % of successful students are Field Independent and the remaining 30% of successful students are Field Dependent. Comparatively, 40,0% of unsuccessful students are Field Independent and 60,0% of them are Field Dependent. Once more, EFL success is dependent on cognitive style



Graph (02): Illustration of the Association of EFL Success and Cognitive Style

The graph (02) above provides findings about the association of successful and unsuccessful EFL students with their cognitive style. It reveals that Field Independent students are generally more successful than Field Dependent students while Field Dependent students

seem weaker than their Field Independent counterparts. In other words, for good/ successful students, fifteen (15) are FI and only six (6) are FD students. On the other hand, for weak/unsuccessful students, only eight (8) are FI and twelve (12) are FD.

Based on the analysis gathered from graph (02) and cross tabulation above, it is evident that there is a difference between academic success and cognitive style and that field independent students are more successful in L2 learning.

3. Data Analysis for Research Question Three

To examine research question three which deals with investigating whether or not there is a difference of successful and unsuccessful EFL students with their cognitive styles, hypothesis two of that research question is assessed using inferential statistics supported with descriptive statistics.

Hypothesis 3: there is no statistically difference between scientific and literary students in their academic success in EFL learning.

Inferential statistics:

Chi Square test of independence has been used to test this hypothesis and the calculated values are representing in the following table:

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,013 ^a	1	,025		
Fisher's Exact Test				,044	,027
N of Valid Cases	40				

Table (11): Chi Square Test of Scientific and Literary Students and EFL Success

Table (11) clarifies the Chi Square test of Scientific and Literary Students and EFL success. As it is illustrated, since the level of significance $p=0.025$ is less than 0.05 ($P=0.025$; $P>0.05$),

then we reject the null hypothesis and accept the alternative one. That is, there is a difference between successful and unsuccessful EFL students in their cognitive style. Further, the statistically significant ($P=0.044$; $P>0.05$) of Fisher's Exact Test is again, a proof of the existence of an association between literary and scientific students and their academic success in cognitive style.

Symmetric Measures

	Value	Approx. Sig.
Nominal by Nominal Phi	,354	,025
N of Valid Cases	40	

Table (12): Phi Coefficient Test of Students' Academic Stream and EFL Success

Table (12) shows the Phi coefficient test of students' academic stream and EFL success. As it is represented, it is clear that both Phi and Cramer's values are statistically significant as ($P=0.025$; $P>0.05$). Another time, this is an evidence of the statistically significant correlation between scientific and literary students and their academic success in L2 learning.

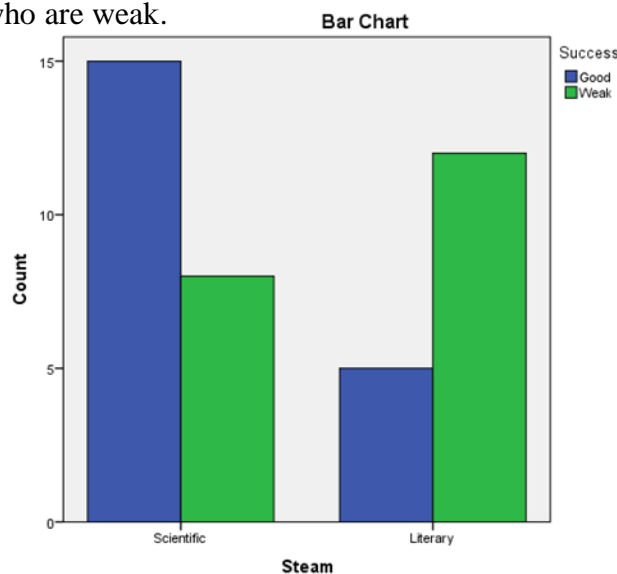
Descriptive Statistics:

For further clarification of these results, descriptive statistics using cross tabulation and graph (03) below obviously show the differences between scientific and literary students in their academic success in L2 learning:

			Success		Total	
			Good	Weak		
Steam	Count		15	8	23	
	Scientific	% within Steam	65,2%	34,8%	100,0%	
		% within Success	75,0%	40,0%	57,5%	
	Literary	Count		5	12	17
			% within Steam	29,4%	70,6%	100,0%
			% within Success	25,0%	60,0%	42,5%
Total	Count		20	20	40	
		% within Steam	50,0%	50,0%	100,0%	
		% within Success	100,0%	100,0%	100,0%	

Table (13): Stream and Academic Success in EFL Learning Cross Tabulation Values

The cross tabulation above illustrates the relationship of academic streams with academic success in EFL learning. The findings illustrate that scientific students are more successful than literary students in EFL success and the opposite. That is to say, 75,0% of good students are scientific, compared with 25,0% of good students that are literary. In addition, 65,2% of scientific students are good, contrasted with 29,4% of literary students who are good students. On the other hand, 40,0 % of weak students are scientific, as opposed to 60,0% of good students who are literary. Further, 34,8 % of scientific students are weak, as compared to 70,6% of literary students who are weak.



Graph (03): Illustration of the Association of Academic Stream with EFL Success

The graph (03) above lays out the finding of the relationship of academic stream with academic success in L2 learning. The graph indicates that scientific students are better than literary students in L2 learning, whereas the latter are weaker than scientific students in L2 learning. That is to say, for good or successful students, there are fifteen (15) scientific contrasted to five (5) literary students. Conversely, for weak or unsuccessful students, the chart shows that there are eight (8) scientific compared to twelve (12) literary students.

From the analyses of graph (03) and cross tabulation above, it is obvious that there is difference between students' academic stream and their success in L2 learning; scientific students are more successful in L2 learning than literary students.

4. Data Analysis for Teachers' Interview

To answer the fourth question that aims at examining EFL teachers' perception of cognitive styles and their effects on L2 teaching- learning process, an interview was carried out with five (5) teachers at M'sila University. Data obtained from the interview was analyzed both qualitatively.

At first, teachers' responses of question one (1) which is about students' individual difference assessment at the beginning of the academic in L2 context, and the type of individual difference assessed indicate that (03) teachers preferred using diagnostic and progressive tests to assess their students' individual differences to detect their strengths and weaknesses in L2 learning, whereas (02) teachers have never opted for such type of test. Yet, most EFL teachers assess individual differences with different ways to inspect the different characteristics of their students in L2 learning. On the other hand, only (01) teacher adopted an overall individual differences tests, that is, he investigated more than one individual difference like aptitude, learning styles and others. On the other hand, (02) teachers opted for a specific type of individual differences test, hence, they only test a specific aspect of individual differences like

learning styles. Moreover, (02) teachers (40%) adopt no individual difference tests for their students.

Next, teachers' responses to the second question of the interview that was about teachers' perception of the concept "cognitive style" in L2 learning and how cognitive style, learning style and intelligence are interrelated demonstrate that (02) teachers perceived cognitive style as merely a cognitive capacity, that is, cognitive style is a mental ability to process, analyze, store, recall and output knowledge in L2 context. On the other hand, (03) teachers conceptualized cognitive style as an individual way of processing information in L2 learning.

On the other hand, regarding the way cognitive style, learning style and intelligence are interrelated, (02) teachers thought that cognitive style is a type of learning styles and they overlap with intelligence in the ways of processing and outputting information, while (03) teachers argued that cognitive style is a type of learning styles, but they are not interrelated with intelligence.

Further, teachers' responses of the third question which was about whether or not teachers have ever opted for a cognitive style test for them as well as their students and the type of the cognitive style test they opted for illustrate that (04) teachers have never opted for a cognitive style test to explore their own and their students' cognitive styles, whereas (01) teacher claimed that he is aware of his own cognitive style without being subjected to any type of cognitive style tests.

Moreover, teachers' responses of question four which is about the impact of having the same or different cognitive styles of teacher and students on the learning process and outcomes clarify that (02) teachers thought that having the same cognitive style for both teacher and students, that is, teacher-students cognitive style match, positively affect the learning process and outcomes and the opposite. Having a different cognitive style between teacher and students, that is, teacher-students cognitive style mismatch, negatively affect the learning process and outcomes. On the other hand, (02) teachers stressed that teacher's cognitive style has no value

when it comes to teaching learning process. According to them, students' cognitive styles recognition is the task of teacher to investigate and as a result adapt his cognitive style to theirs, hence, better L2 outcomes are anticipated. Conversely, (01) teacher contended that teacher's comprehensive authority negatively affect L2 learning and outcomes, that is, teacher would impose his cognitive style on his students. Consequently, those who have different cognitive style of that of the teacher achieve less than those who have the same cognitive style of the teacher.

Furthermore, the answers of question five (5) which is about whether or not raising students' awareness of their cognitive styles of value to their learning process and the ways teachers use to raise their students' awareness of their cognitive styles and how to aid them adapting to anew cognitive styles to cope with teaching learning situations indicate that the overall teachers (5) agreed that raising students' awareness of their cognitive styles contributes in improving their L2 learning. Correspondingly, three (3) teachers considered that subjecting their students' to face-to-face interactions to discover their cognitive styles as well as demonstrating the strengths and weaknesses of each style is of value to raise their awareness and motivate them adopting new styles as well. Comparatively, two teachers thought that subjecting students to a valid and reliable cognitive style test, provided by the ministry once at a time, is the typical way to raise their students. Also, they thought that engaging students in new styles inductively through tasks variety will contribute in helping them adopting new style.

For the sake of examining whether or not and how the academic streams at secondary schools have a role in shaping students' cognitive styles, that consequently effect their language learning at the university, 03 teachers agreed that the academic stream at secondary school has an impact on shaping students' cognitive styles that reversely, effect L2 learning at college because they thought that students different preferences in language learning, for instance some like linguistics and some like literature, is due to their cognitive styles that has been already shaped by the academic streams at secondary schools. Conversely, the two (2) other teachers

disagreed on the influence of academic stream on cognitive style and ultimately on L2 learning. They assumed that cognitive style is an innate feature that determines students' choices and success in any field, thus academic streams has no impact on cognitive style and L2 learning.

Lastly, teachers' answers analysis of question (7) which deals with the reasons that make FI (Field Independent) students achieve higher than their counterparts of FD (Field Dependent) students indicated that (3) teachers reflected that the disembedding and restructuring abilities as well as strategies that characterize FI learner make them relatively more successful than FD students in L2 learning. On the other hand, (2) teachers thought that success of FI students in L2 learning is back to autonomous nature as well as their practices in real and authentic environments.

3. Discussion

This section is devoted to discuss the findings on cognitive style and academic streams and their impact on students' success in L2 learning. Therefore, this section includes discussion of the findings, conclusions, recommendations and pedagogical implications.

3.1 Academic Stream and Cognitive Style

One of the objectives set for this study was to explore whether or not students' academic stream has an impact on their cognitive style. Hence, after testing the null hypothesis in the previous section that states that there is no statistically significant difference between scientific and literary stream on cognitive style, the null hypothesis was rejected and the alternative one was accepted as the values of chi square and phi coefficient tests indicated that ($p=0.03$ less than 0.05 value) for chi square test and ($p = 0.31$ which is less than 0.05) for phi coefficient. Consequently, there is a statistically significant difference between academic stream and cognitive style. In other words, the findings showed that most field independent learners were scientific while more field dependent students were literary. This finding agrees with the study findings revealed by Mezian and Zerkaoui (1999), where they find that cognitive style differs among college teachers and students according to their field of study or rather their streams.

They demonstrate that exact sciences students are more left brain than their counterparts of human sciences students. In the same line of thought, Tomar (2017) investigates the cognitive style of senior secondary school students with respect to their streams. The findings of his study indicate that there is a significant difference between cognitive styles among students due to variation in their art, science and commerce streams. He finds that scientific students tend to integrated style, art students tend to intuitive style whereas commerce students incline to split style. It is evident from the findings of this study as well as other comparative studies that academic stream has an impact on cognitive style and that the nature of each stream may contribute in shaping a particular cognitive style and its characteristics.

3.2 EFL Success and Cognitive Style

The results obtained from after testing the null hypotheses of the second research question that stated that there is no statistically significant difference between successful and unsuccessful students in their cognitive style, the null hypotheses was rejected and the alternative one was accepted as the values of chi square and phi coefficient tests indicated that ($p=0.037$ less than 0.05 value) for chi square test and ($p = 0.47$ which is less than 0.05) for phi coefficient test. Thus, there is a statistically difference between successful and unsuccessful students and their cognitive style. The same findings revealed that field independent students outperform their counterparts of field dependent students in L2 learning. Thus, field independent students are more successful than field dependent students in L2 learning. Correspondingly, many studies support such findings. For instance, Hansen and Stanfield (1982) demonstrate that field independent student perform better than field independent students in L2 learning which in this case, was Spanish. Further, they argue that the FI restructuring capacities obviously contribute to linguistic and communicative success, and integrative performance in formal course at the university level. Accordingly, FD and FI students seemed to process and product linguistic structures in different ways (Naiman, 1978). Correspondingly, Tucker et al. (1976) find that FI is an important predictor of success in L2 learning on a general achievement test, though it was

not so associated with performance in tests of reading and listening comprehension or oral production.

Moreover, many researcher ascertain the influence of cognitive style on overall academic achievement. For instance, Davis and Cohan (1989), based on their research, state that field independent students typically represent a higher level of achievement than field dependent students do. In the same line of thought, Davis (1991) confirmed his previous research findings and argues that all findings show a common pattern, that field independent learners perform significantly better than field dependent learners in virtually every curriculum areas.

In fact, it's obvious that most studies agree that FI students achieve higher than their counterparts of FD especially when it comes to general achievement tests. This supremacy reveals in the different characteristics that FI individuals have particularly restructuring and desembedding abilities.

3.3 Academic Stream and Academic Success in L2 learning

Assessing the third null hypothesis of the third question in this study showed that ($p=0.025$ is less than 0.05) for chi square test and ($p = 0.025$ which is less than 0.05) for phi coefficient test. Considering these values, the null hypothesis was rejected and the alternative one was accepted. That is to say, there is a statistically significant difference between students' academic stream and their academic success in L2 learning. Such difference is clear from the findings. That is, scientific students outperformed their literary counterpart in L2 learning. These findings are supported by many studies. For instance, Nour Eddin and Abd Rahim (2018) claim that there are significant differences between scientific and literary student in the mind habits, motivation as well as productive learning in various dimensions. Further, they argue that scientific students are successful in some fields and literary students are successful in other fields. Accordingly, Chada (2016) reinforced the previous stance and ascertains that the difference between both streams lies in the mind habits in favor of scientific stream. She claims that generally, scientific students perform better than literary students in many disciplines.

Predominantly, since most scientific students are field independent, and field independence is attributed to success in L2 learning and across many fields due to their analyzing, disembedding and restructuring abilities, it seems reasonable that scientific students are more successful than literary students in L2 learning.

3.4 Teachers' Interview Discussion

Teachers' Responses on First Question Discussion

The analysis of teachers' responses to question one revealed that most EFL teachers at M'sila University testify their students' individual differences in L2 learning at the beginning of each academic year using different test categories. In fact, few teachers target the specific individual difference as most teacher testify previous knowledge of a subject, that is abilities more than specific individual differences like personality and cognitive style. Accordingly, such findings show that EFL teachers at M'sila University lack of emphasizing on specific students differences that may help in enhancing teaching learning process, rather they assess abilities rather than differences.

Teachers' Responses on Second Question Discussion

For question two analysis, most EFL teachers conceptualize "cognitive style" in L2 learning as an individual way of processing information in L2 learning. This finding agrees with what most researchers said about the notion of cognitive style. For instance, according to Chen and Macreadie (2002) among others, cognitive style has been used by researchers to investigate how individuals process information and make choices in learning, cognitive style can be viewed as an individual preferred and habitual approach of organizing and representing information. On the other hand, most EFL teachers think that cognitive style is nothing but a sort of learning style, yet both cognitive style and learning style and intelligence are not interrelated concepts. Indeed, these claims are confirmed in the literature. For instance, Messick (1984) claims that cognitive and learning styles handle individuals' preferences in making sense out of their surrounding environment by gathering, examining, assessing and elucidating data

(Messick, 1984). Further, Riding and Rayner (2000) distinguishes between cognitive style and intelligence and states that they are two distinctive theories to the cognition comprehension. He claims that intelligence scaling is about evaluating one's ability, pace and the amount of information he can deal with while for cognitive style scaling, it deals only with the typical forms and the quantity of information one handles.

Teachers' Responses on Third Question Discussion

For the third question, it is obvious that EFL teachers at M'sila University are not aware of which type of cognitive style they own themselves as well as of their students as neither them nor their students have been subjected to any cognitive style test. Such findings reveal that EFL teachers overlook cognitive style tests or are unconscious of the efficiency of cognitive style awareness as a potent variable in L2 teaching and learning process and achievement.

Teachers' Responses on Fourth Question Discussion

For the fourth question, most teachers contend that teacher-student cognitive style match positively affect the teaching learning process as well as students achievement and the opposite. They further contend that teacher awareness of his students' cognitive style is more important for him to adapt his own cognitive style to theirs. In fact, such results agree with most correspondent research findings. For instance, For instance, McKenna (1990) among others, claims that FI students can perform effectively when matched with FI teachers and FD students will perform more effectively when matched with FD teachers.

Teachers' Responses on Fifth Question Discussion

For the fifth question, all teachers stressed that raising students' awareness of their cognitive style would consequently improve their L2 learning. Besides, they think that raising their students awareness as well as motivate them to adopt the features of each style may include face-to-face discussion and demonstrating the differences between cognitive styles characteristics or engaging them inductively in tasks that require variations on different

cognitive style characteristics. Actually, these findings are supported by many researchers. For instance, Jones (1993) states that “due to the fact that students learn something about their own mental processes, they may then be able to structure and make sense of otherwise unordered experience and of their intuitive or random use of procedures. This has a great value in education, most particularly in self-study or independent learning” (p. 197). Furthermore, Perry (1994) claims that if there was an understanding of cognitive or learning styles, supportive provisions could be made among persons of diverse styles to probably recompense the deficits of one style. Further, he contends that an application for variety was significant in any instructive setting. Thus, when students are permitted to recognize the way they learn, there is more prospect for effective and operative learning and teaching.

Teachers’ Responses on Sixth Question Discussion

For the sixth question, the majority of teachers thought that academic stream is likely to shape students cognitive style, which in turn, affect their achievement in L2 learning. Indeed, our study findings confirmed that there is a significant difference between academic stream and cognitive style. It was found that most scientific students are FI and more literary students are FD with the formers are more successful in L2 learning.

Teachers’ Responses on Seventh Question Discussion

Lastly, for the seventh question, most teachers argued that the supremacy of FI students over their counterparts of FD students are due to the analyzing, restructuring and disembedding abilities that the formers have. Obviously, such finding is reinforced by many scholars. Hansen and Stanfield (1982) among others, contend that the FI restructuring capacities obviously contribute to linguistic and communicative success, and integrative performance in formal course at the university level.

In conclusion, it is evident from teachers’ interview analysis and discussion that EFL teachers at M’sila University mostly perceive cognitive style as an individual difference and a learning style in L2 learning. They conceptualize it as an individual of processing information.

Further, they agree that cognitive style is a potent variable that may improve teaching learning process as they raise their students' awareness of it as they adapt them to new styles to compensate deficiencies in L2 learning.

Conclusion

The purpose of the present study is to investigate whether or no students' academic streams has an impact on their cognitive style and whether or not there is a significant difference between cognitive style and academic stream on EFL academic success in L2 learning. Additionally, this study aims to explore EFL perception of cognitive style and its effect on L2 teaching and learning as well as achievement. For realizing such objectives, it was hypothesized that there is no difference between academic stream and cognitive style, also it was hypothesized that there is no impact of academic stream and cognitive style with academic success in L2 learning. The results indicated that there is a significant difference between academic stream and cognitive style. Further, it was found that there is a significant association of academic stream and cognitive style with academic success in L2 learning. On the other hand, EFL teachers' responses to interview questions revealed that they perceive cognitive style as an individual habits of processing information, as they ascertained the importance of that construct as a potent variable that may enhance L2 teaching and learning process as well as achievement.

General Conclusion

General Conclusion

Individual differences are a central area of interest for scholars to investigate their impact on students' achievement and to improve instructional designs and activities. One of the individual differences that gained attention by researcher recently is cognitive style. It has been noticed that there are variations among students' L2 achievement at M'sila University in Algeria. That was the endeavor of that research to investigate students' cognitive style as well as their prior academic achievement and assess if there is any possible impact of these variables on EFL academic achievement. Hence, the ultimate objectives of the current study was to examine whether or not scientific and literary streams have a significant difference with cognitive style. Moreover, this study aimed at investigating whether or not academic stream and cognitive style has an influence on the academic success in L2 learning. Besides, this study sought to get a thorough understanding of the ways EFL teachers handle the notion of cognitive style and its effect on L2 teaching and learning process.

It was hypothesized that there is no significant difference between academic stream and cognitive style for the first research question. Also, for the second and the third research questions, it was hypothesized that academic stream and cognitive style have no difference with academic success in L2 learning.

To assess these hypotheses, causal-comparative design was the best design to handle them. Based on the values chi square and phi coefficient statistical tests, all null hypotheses of this study were rejected and the alternative ones were accepted. In other words, the results indicated that there is a significant difference between academic streams and cognitive style where it was demonstrated that scientific students were more FI and literary students were more FD. Furthermore, it was found that there is a significant difference between cognitive styles and academic achievement in L2. That is to say, FI independent students were more successful in L2 learning. Lastly, it was indicated that academic stream has an impact on academic success in L2 learning. Thus, those of scientific stream were found to be more successful in L2 learning.

This study is a whole of two chapters. The first chapter is devoted to the theoretical

framework of the study. In other words, it is dedicated to investigate the related literature. It provides a description of the most crucial elements regarding cognitive style and its relationship with academic achievement. On the other hand, the second chapter is dedicated to the practical part of the study. It provides a thorough descriptions of the methodology adopted by the researchers to examine the research questions as well as the sample which is drawn from Master 2 students at M'sila University , data collection (CSQ and teachers' interview) and statistical (Chi Square and Phi Coefficient Test) tools that were used in the study.

Limitations

There are numerous limitations that occurred in this study as it took place in an extraordinary circumstances; chiefly due to Covid-19 pandemic that indeed hindered the study progress. Further, this study is limited to the sample size for both; students and teachers. Due to the lockdown that has been issued from the second semester, it was very difficult to gather a representative sample (only 37 participants with 12 participants for the pilot study and 5 EFL teachers) particularly that our study required a sample with four different characteristics for students. In addition, this study is limited to Master 2 students and EFL teachers at M'sila University in Algeria as the population that the sample of the study has been drawn from. Moreover, the time taken by the participants to fill the online questionnaire was considered to be a paramount limitation for this study. We were supposed to receive 50 filled questionnaire but we only received 43, 5 of them were rejected due to uncompleted or missing answers. Additionally, the participants' scores that were used in this study were attributed to the first semester only. Furthermore, it was difficult to make face-to-face interviews with teachers. Thus, we only made a telephone interviews through messenger application. Another secondary limitations were: the lack of face-to-face contact with our supervisor to provide effective feedbacks, the lack of face-to-face contact with the partners that conducted such study to make effective decisions and choices and ultimately, the lack of primary and concrete resources like books as most of the resources that were opted for were from the internet.

Further Research

This research has resulted promising findings as it related prior academic stream and cognitive style to academic success in L2 learning. Hence, such findings could be a watershed for many scholars in the fields that deals with individual differences, learners' needs as well as those examining the ways of improving instructional designs and practices. The findings of this study confirmed the variations in L2 achievement and found out that FI and scientific student are more successful in L2 learning than FD and literary students. This study targeted Master 2 students as the population that the sample has drawn from and the scores that were used were attributed for one semester. Hence, to reinforce the findings of this study, it is recommended for further research that extend the sample size with different population, different disciplines and through longitudinal investigation of students' progress. It is also recommended for a thorough examinations of the reasons that make field independent and scientific students more successful than field dependent and literary students in order to improve instructional designs and practices and to assist students in vocational decisions.

Recommendations

Based on the findings that this study arose, the recommendations below are suggested:

- Teachers should be aware of their as well as the cognitive style of their students, determine the prevalent one and apply its characteristics in different instructional practices.
- Teachers should be aware of their students' academic stream backgrounds.
- Teachers have to raise their students' awareness about their cognitive styles and motivate them to engage in another styles to help them compensating deficiencies in learning as well as modifying thought and behavioral strategies of learners.
- Attention should focus on the preference for one stylistic dimension over another, and

on the modifiability of cognitive dispositions.

- Cognitive styles should be included in instructional designs.
- Teachers should be instructed on developing different cognitive styles for students.
- Preparing for seminars and programs that tackle topics that are related to cognitive styles.
- Executing instructional programs for all educational levels to develop cognitive styles

Pedagogical Implications

The results of this study have indicated that cognitive style as any other individual difference in learning proved to be a potent element that influence students learning process as well as their achievement in many fields specifically in L2 learning and L2 outcomes. Moreover, this study has also shed the light on teachers-students cognitive styles match and mismatch and their influence on academic achievement. Further, this study has confirmed the relationship of academic streams with academic achievement in L2 and revealed that L2 students who were scientific in secondary school achieved higher than their counterparts of students who were literary. Thus, the results of this study have a paramount pedagogical implications in all field generally and for L2 learning specifically. Such pedagogical implications are listed as follows:

- The administration would provide a valid learning styles tests for students at the beginning of the academic year specifically a cognitive styles test. It is of a great importance to subject novel students (first year students) of such a test once at a time to determine their cognitive styles type specially that they come from two different backgrounds and distinct streams (scientific – literary)
- Moderation should be incorporated into teaching so that students are taught how to learn thereby reducing frustration for both the learner and the teacher.

- Curriculum designers should take into account the results of such a study to adopt appropriate approach to promote significance learning.
- Teachers have to subject themselves to a cognitive styles test to better deal with their student whether those who match their cognitive styles or most importantly those who mismatch their cognitive styles to help them adopting to a new styles to insure better teaching learning performance.
- Administrations in secondary schools must subject students in such a type of test to be more helpful in academic and career counseling.

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Appendices

Appendix (1)

FIELD INDEPENDENCE/DEPENDENCE QUESTIONNAIRE

By Robert Wyss (2002)

Full Name: _____

Group: _____

Academic Stream: Scientific Stream _____

Literary Stream _____

Instructions to learners:

Check one box in each item that best describes you. Boxes **Strong agree** would indicate that the statement is very much like you. Boxes **Agree** would indicate that the sentence is more or less like you. Box **Neutral** would indicate that you have no particular inclination one way or the other.

- Fill just one box from each statement that relatively close to you
- Each statement includes (2) contrastive parts that are related to the same act, **please select the part that closely describe your Inclination by choosing only one box.** Eg:

1	I have no problem concentrating amid noise and confusion while studying.				OR				I need a quiet environment in order to concentrate well in my studies.
----------	--	--	--	--	----	--	--	--	--

one box. Eg:

Here I selected the part of the statement that suit my attitude toward studying in noise. Notice that I choose only **one** box, thus, I strongly agree that I can study in noise without any problem. Moreover, the second part of the statement does not represent my inclination, hence, I left it blank.

	Statement	Strongly agree	Agree	Neutral		Neutral	Agree	Strongly agree	Statement
1	I have no problem concentrating amid noise and confusion while studying.				OR				I need a quiet environment in order to concentrate well in my studies.
2	I enjoy analysing subject content and thematic issues personally in order to understand it better				OR				I find it tedious and boring to analyse the subject content and thematic issues
3	I feel I must understand every word of what I read or hear in every subject in class				OR				I don't mind reading or listening on the subject teaching without understanding every single word as long as I 'catch' the main idea.
4	I think individual study is the key to effective subject learning.				OR				I think discussion is the key to effective subject learning.
5	I prefer working alone to working with other people.				OR				I really enjoy working with other people in pairs or groups.
6	Receiving feedback from other people really doesn't affect my learning at all.				OR				I find feedback useful as a means of understanding my problem areas.
7	I usually look for solutions to my learning challenges by thinking through and acting on my skills and experiences				OR				I usually seek to know what other people would handle similar challenges and try out the various ways of solving them
8	I usually pick my books and read even when my classmates are relaxing in the fields				OR				I can read well when my classmates are settled and focused for individual studies around me
9	I don't like it when other activities interfere with my learning timetable				OR				I like it when I'm exposed to various activities in between my learning timetable to break the monotony of continuous studying
	<i>Field Independent (FI) Score</i> _____								<i>Field Dependent (FD) Score</i> _____

- Likewise, complete the remaining statements with the same way as in the above example.

Appendix (2)

Interview Questions

Dedicated for EFL Teachers at M'sila University

Q1. Do you assess your students' individual differences at the beginning of the academic year to detect their strengths and weaknesses in the way(s) they learn the L2? If yes, on what individual difference(s) do you base your assessment? Aptitude, Learning styles, personality tests, or others like..?

Q2. How do you perceive the notion of cognitive style in L2 learning? And, how do you think are cognitive styles, learning styles and intelligence interrelated?

Q3. Have you ever opted for a cognitive style test to explore your own and your students' cognitive styles? If yes, what was the test category you opted for?

Q4. How does having the same or different cognitive style(s) between teacher and learner affect the learning process and outcomes?

Q5. Is raising students' awareness of their cognitive styles of value to their learning process? If yes, how do you raise their awareness, and how do you aid them adapt to a new cognitive style to cope with the teaching/learning situation?

Q6. Do students' streams (scientific vs literary) at school play a role to shape their cognitive styles and hence effect their language learning at university? How?

Q7. Why do you think FI (field-independent) students achieve higher than FD (field-dependent) students at L2 learning?

Cognitive Style Questionnaire that was dedicated for pilot study

FIELD INDEPENDENCE/DEPENDENCE QUESTIONNAIRE

By Robert Wyss (2002)

Instructions to learners:

Check one box in each item that best describes you. Boxes A and E would indicate that the statement is very much like you. Boxes B and D would indicate that the sentence is more or less like you. Box C would indicate that you have no particular inclination one way or the other.

	Statement	A	B	C	D	E	Statement
1	I have no problem concentrating amid noise and confusion while studying.						I need a quiet environment in order to concentrate well in my studies.
2	I enjoy analysing subject content and thematic issues personally in order to understand it better						I find it tedious and boring to analyse the subject content and thematic issues
3	I feel I must understand every word of what I read or hear in every subject in class						I don't mind reading or listening on the subject teaching without understanding every single word as long as I 'catch' the main idea.
4	I think individual study is the key to effective subject learning.						I think discussion is the key to effective subject learning.
5	I prefer working alone to working with other people.						I really enjoy working with other people in pairs or groups.
6	Receiving feedback from other people really doesn't affect my learning at all.						I find feedback useful as a means of understanding my problem areas.
7	I usually look for solutions to my learning challenges by thinking through and acting on my skills and experiences						I usually seek to know what other people would handle similar challenges and try out the various ways of solving them
8	I usually pick my books and read even when my classmates are relaxing in the fields						I can read well when my classmates are settled and focused for individual studies around me
9	I don't like it when other activities interfere with my learning timetable						I like it when I'm exposed to various activities in between my learning timetable to break the monotony of continuous studying
	TOTAL						
	Field Independent (FI) Score						<i>Field Dependent (FD) Score</i> _____

