

## Investigating Algerian EFL Students' Learning-Style and Brain-Dominance Profiles

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### Abstract

Learning styles and brain-dominance preferences continue to attract, today, the attention of both researchers and practitioners in the field of education. Learners are different from each other and this difference matters in learner-centred instruction. This work is an attempt to identify the students' learning-style and brain-dominance profiles at the Department of English, Larbi Ben M'hidi University, Oum el Bouaghi, Algeria. Seventy two Master Two-level students took part in this study. The Barsch Learning-Style Inventory and the Brain-Dominance Inventory were used as data collection tools. The results show that most of the participants have a visual mode of learning, whether predominantly or in combination with the auditory mode. In addition, the majority of the students are found to have a slight preference either to the left- or the right-brain hemisphere. The paper eventually discusses ways to enable teachers to tailor classroom instructional strategies to students' learning preferences, and hence capitalize on their learning strengths.

**Keywords:** brain dominance, learning process, learning styles, teaching strategies

**Cite as:** Merrouche, S. (2017). Investigating Algerian EFL Students' Learning-Style and Brain-Dominance Profiles. *Arab World English Journal*, 8 (1).

DOI: <https://dx.doi.org/10.24093/awej/vol8no1.28>

## Introduction

Students are different in various respects: motivation levels, abilities, needs, interests, learning speed, strategies and styles. Every student is a unique person able to demonstrate different individual skills, and is constantly learning and improving. An aspect of the learning process that has recently received considerable attention is that of learning preferences. Research in this area has enlightened teachers regarding the ways learners learn. As a result, teachers have become more and more sensitive to students' learning differences. In fact, different learning modes entail different instructional techniques. In other words, if students are taught according to their preferred ways of learning, the learning/teaching process is likely to be effective. University faculty have, for a long time, emphasized the content of what is to be learned; many of them tend to spoon feed students thinking that if they do not cover the curriculum, they will not achieve the aims of the course. It is high time they considered the individual learning-style characteristics and brain behaviour of their students.

The aim of this paper is to gain a better understanding of individual differences regarding learning styles and brain dominance. This work considers learning modes as described in Neuro-Linguistic Programming research, and discusses the notion of hemispheric dominance, before it moves on to examining students' responses to a learning-style inventory and a brain-dominance test, and their implications.

## Definition of Learning Styles

A learning style is not an easy concept to define (Cassidy, 2004). It is commonly referred to in the literature as 'a learning mode' and 'a learning preference'. Roughly speaking, a learning style denotes an individual's particular way of learning. For example, one may feel more comfortable when working independently rather than with others; another would enjoy watching a movie instead of reading its corresponding novel. Hartley (1998) defines learning styles as ways in which individuals typically approach learning activities. In the words of Dunn (2000), learning styles denote "the way(s) students begin to concentrate on, process, internalize, and remember new and difficult academic information" (p. 8). According to Reid (1995), learning styles are internally-based features for the processing of new information, whereas Pritchard (2009) believes that they are not fixed characteristics and that learners can have different styles in different contexts. Sadler-Smith (as cited in Lum, 2006) distinguishes a learning style from a learning preference in that the former is perceived as an information-processing activity while the latter has to do with one's choice of a mode of learning over another.

The idea that learners have preferred approaches to learning is underlain by the assumption that humans are more or less receptive to different environmental stimuli. They have different sensory experiences and learning channels. In his 'Multiple Intelligences' theory, Gardner (1985) explains that there are varied ways of knowing and learning about the world, and that humans have different levels of intelligence across a variety of intellectual domains.

The most common description of learning styles is the one found in Neuro-Linguistic Programming research. Three major learning styles were identified, namely the 'Visual', the 'Auditory' and the 'Kinesthetic' styles (the VAK model). Visual learners favour visually presented information and find it easy to remember what they see or read. Auditory learners learn better by listening and have the ability to memorise what they hear effortlessly. Kinesthetic

learners learn by doing and have a good memory when it comes to recalling events and physical experiences. Though every learner may use all three styles, s/he tends to have an inclination to use one style over the others. Fleming (as cited in Pritchard, 2009) puts forward the V-A-R-K system which covers four human senses, and hence four learning styles, i.e. the 'Visual', the 'Auditory', the 'Reading' and the 'Kinesthetic' style. Whether there are three, four or many more styles, whether they are associated with human senses or other aspects, what counts most is to raise teachers' and learners' awareness about the fact that there are different learning ways, that is, different strengths and needs, which necessitate different teaching procedures.

As a matter of fact, research evidence suggests that adapting instruction to individual differences in learning styles is likely to lead to effective learning and better academic performance (Brown, 1994; Sims & Sims, 1995). According to the learning-style theory (Dunn & Griggs, 2000), teachers should opt for methodical pluralism and students are to be taught, at least initially, in accordance with what meets their needs.

Learning-Style Inventories are used to identify one's learning style. Beginning from the 1970's, researchers have developed various instruments to assess learning styles (Dunn & Dunn, 1972; Schmeck, Ribich & Ramanaiah, 1977; Gregorc, 1979; Hunt, 1979; as cited in Kang, 1999). More recent models include, for instance, Honey & Mumford's (1992) Learning Style Questionnaire and Kolb's (1999) Learning Style Inventory (as cited in Boström & Lassen, 2006). According to Coffield et al. (2004), there are more than 70 models to identify and analyse learning styles, but they vary in construct and predictive validity; several ones are available online. This study is based on the Barsch Learning Style Inventory (Barsch LSI) (Davies et al., 1994).

### **Brain Theory Research**

Brain research is a relatively new area of inquiry and many of its findings and implications are controversial. Some of the most discussed notions in this regard are 'brain laterality' and 'hemispheric dominance': The brain is reported to have two hemispheres with functional difference and dominance, a fact which has a tight link with the way one learns. As pointed out by researchers in the field like Williams (1983), Davies et al. (1994) and McCarthy, Germain & Lippitt (2006), the two brain hemispheres function and process information differently. The left hemisphere is geared to what is verbal, sequential, analytical, abstract and logical, while the right hemisphere manages global, holistic, concrete, intuitive and visual-spatial functions. Generally speaking, people use both hemispheres holistically, but most individuals have a propensity to use strategies primarily connected to one hemisphere, and are, thus, said to be left-brain dominant or right-brain dominant. Some people have approximately even preferences and are said to have bilateral dominance.

Left-brain learners are linear in that they process information following a sequence. They are analytical, for they pay close attention to fine details. It follows that they are logical and organized. They give importance to theory and master abstract and factual information. They also have the ability to assimilate new information quickly. Furthermore, they are competitive, time-oriented and prefer to work individually. On the other hand, right-brain learners are just the opposite. In fact, they are global in that they look at the broad picture and process information as a whole. They are, besides, intuitive, spontaneous and creative, but they are not competitive and

take time to assimilate new information. Moreover, they are event-oriented and give more importance to practice.

Several brain-dominance tests in the form of self-administered brain-dominance inventories can be found in the literature; some are available online. They are usually accompanied with materials elucidating how to identify one's brain-dominance profile.

### **The Study**

This study was carried out at Larbi Ben M'hidi University, Oum el Bouaghi, Algeria, during the first semester of the 2016-2017 academic year. It aims to answer the following research questions:

1. What are the learning-style profiles of Master Two-level students at the English Department, Larbi Ben M'hidi University, Oum el Bouaghi?
2. What are their brain-dominance profiles? And
3. How can English as a Foreign Language (EFL) teachers address diversity in learning profiles?

### ***Participants***

The learning-style and the brain-dominance inventories were administered to all Master two-level students at the Department of English, Faculty of Letters and Languages, that is, 130 students. However, only 72 students (55.38%) completed both inventories and dealt with all items in each inventory. Their age ranged from 22 to 25 years. 54 (75%) were female while 18 (25%) were male students. 50 of them were majoring in EFL Didactics and 22 in EFL Literature and Civilization. Both groups were taken into account in order to compare their results.

### ***Instruments***

As mentioned previously, this study is based on two inventories: The Barsch LSI and the Brain-Dominance Inventory (Davies et al., 1994). The first tool determines the extent to which a learner is visual, auditory or tactile. The second tool categorizes learners into right-brain, left-brain or bilateral learners.

The Barsch LSI consists of a total of 24 items rated on a five-point scale including "Almost Always" (4 points), "Usually" (3 points), "Sometimes" (2 points), "Seldom" (1 point) and "Almost Never" (0 point). Students were supposed to select the option they think applies to them the most. The statements point to the three learning preferences: visual, auditory, and tactile.

The Brain-Dominance Inventory used in this study consists of a series of 39 preference statements. The latter are presented in the form of incomplete items, and each one of them has three options ("a", "b", and "c") pointing out different ways of acting or learning. Students were required to specify their preference by ticking the appropriate box.

### ***Analysis of the Findings***

Learning styles and brain dominance were identified on the basis of the scores students got for each item in the inventories. Frequency and percentage were used in this respect. It is noted that in the Barsch LSI, a score in one area can be considered as significant when it exceeds

scores in the other areas with at least four points. In the Brain-Dominance Inventory, the number of "a's", "b's" and "c's" must total 39. A student's final score is computed by dividing the obtained "b- a" score by 3, 2, or 1, depending on whether the "c" score is 17 or higher, from 10 to 16, or less than 10, respectively.

**Table 1**  
*Didactics Students' Scores in the Barsch LSI*

Student	VPS	APS	TPS	Predominant Style	Student	VPS	APS	TPS	Predominant Style
1	26	20	20	<b>visual</b>	<b>26</b>	27	17	15	<b>visual</b>
2	24	18	20	<b>visual</b>	<b>27</b>	19	19	15	<b>visual/auditory</b>
3	24	15	21	<b>visual/tactile</b>	<b>28</b>	22	17	11	<b>visual</b>
4	17	28	19	<b>auditory</b>	<b>29</b>	19	27	23	<b>auditory</b>
5	24	16	14	<b>visual</b>	<b>30</b>	16	25	14	<b>auditory</b>
6	19	19	15	<b>visual/auditory</b>	<b>31</b>	19	18	19	no preference
7	19	15	13	<b>visual</b>	<b>32</b>	09	30	17	<b>auditory</b>
8	20	25	20	<b>auditory</b>	<b>33</b>	16	24	16	<b>auditory</b>
9	19	15	21	<b>visual/tactile</b>	<b>34</b>	19	20	08	<b>visual/auditory</b>
10	21	17	22	<b>visual/tactile</b>	<b>35</b>	25	25	21	<b>visual/auditory</b>
11	13	17	13	<b>auditory</b>	<b>36</b>	14	24	20	<b>auditory</b>
12	20	21	21	no preference	<b>37</b>	13	15	09	<b>visual/auditory</b>
13	17	24	18	<b>auditory</b>	<b>38</b>	16	26	10	<b>auditory</b>
14	23	19	23	<b>visual/tactile</b>	<b>39</b>	28	19	13	<b>visual</b>
15	22	16	12	<b>visual</b>	<b>40</b>	16	18	12	<b>visual/auditory</b>
16	23	21	16	<b>visual/auditory</b>	<b>41</b>	25	15	16	<b>visual</b>
17	25	17	17	<b>visual</b>	<b>42</b>	20	10	17	<b>visual/tactile</b>
18	20	19	12	<b>visual/auditory</b>	<b>43</b>	15	20	17	<b>auditory/tactile</b>
19	18	15	23	<b>tactile</b>	<b>44</b>	07	26	20	<b>auditory</b>
20	17	25	18	<b>auditory</b>	<b>45</b>	26	17	17	<b>visual</b>
21	24	17	18	<b>visual</b>	<b>46</b>	27	23	15	<b>visual</b>

22	18	14	12	<b>visual</b>	<b>47</b>	19	22	15	<b>visual/auditory</b>
23	25	21	16	<b>visual</b>	<b>48</b>	21	22	16	<b>visual/auditory</b>
24	12	30	12	<b>auditory</b>	<b>49</b>	17	28	15	<b>auditory</b>
25	24	19	17	<b>visual</b>	<b>50</b>	24	10	17	<b>visual</b>

**VPS:** Visual Preference Score

**APS:** Auditory Preference Score

**TPS:** Tactile Preference Score

**Table 2**

*Literature/Civilization Students' Scores in the Barsch LSI*

Student	VPS	APS	TPS	Predominant Style	Student	VPS	APS	TPS	Predominant Style
1	28	22	21	<b>visual</b>	<b>12</b>	25	21	25	<b>visual/tactile</b>
2	14	27	18	<b>auditory</b>	<b>13</b>	27	31	27	<b>auditory</b>
3	20	13	17	<b>visual/tactile</b>	<b>14</b>	18	30	09	<b>auditory</b>
4	19	21	10	<b>visual/auditory</b>	<b>15</b>	25	18	14	<b>visual</b>
5	27	18	19	<b>visual</b>	<b>16</b>	16	24	13	<b>auditory</b>
6	22	16	16	<b>visual</b>	<b>17</b>	18	21	13	<b>visual/auditory</b>
7	22	18	16	<b>visual</b>	<b>18</b>	25	27	18	<b>visual/auditory</b>
8	21	15	12	<b>visual</b>	<b>19</b>	20	21	16	<b>visual/auditory</b>
9	26	17	22	<b>visual</b>	<b>20</b>	20	16	16	<b>visual</b>
10	21	19	11	<b>visual/auditory</b>	<b>21</b>	26	17	20	<b>visual</b>
11	19	22	14	<b>visual/auditory</b>	<b>22</b>	30	30	17	<b>visual/auditory</b>

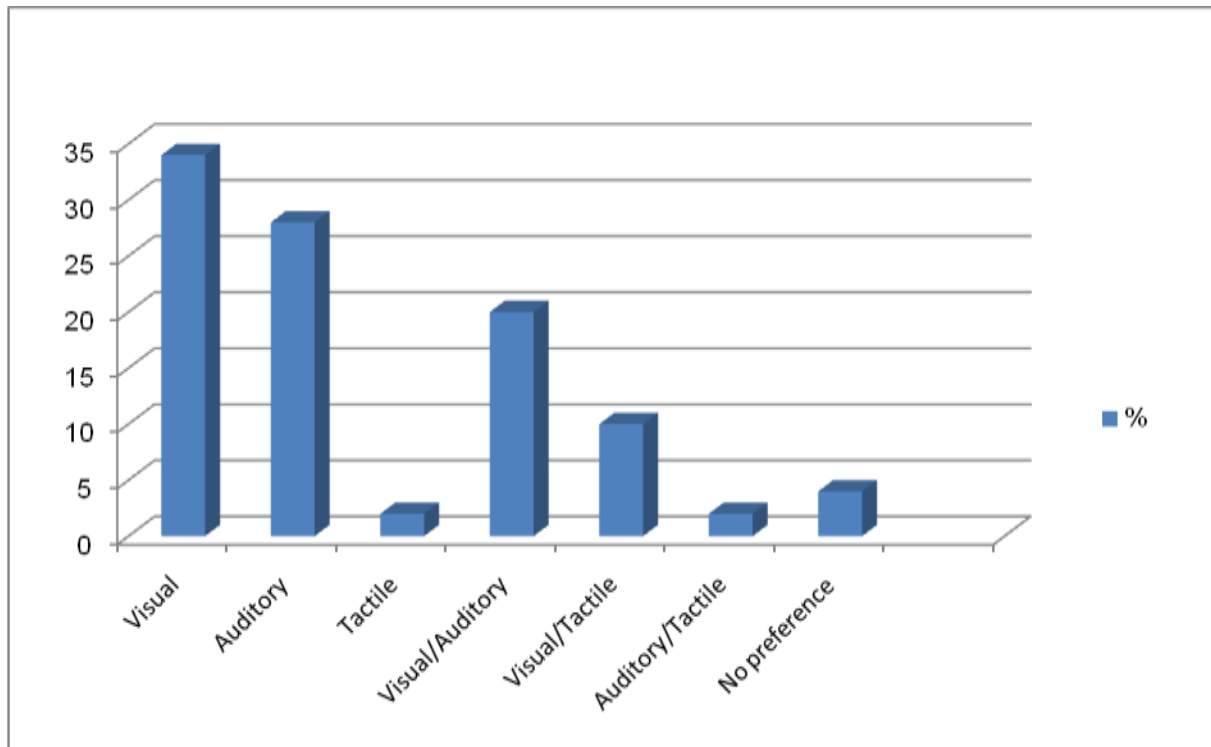


Figure 1: Didactics Students' Categorization according to the Barsch LSI

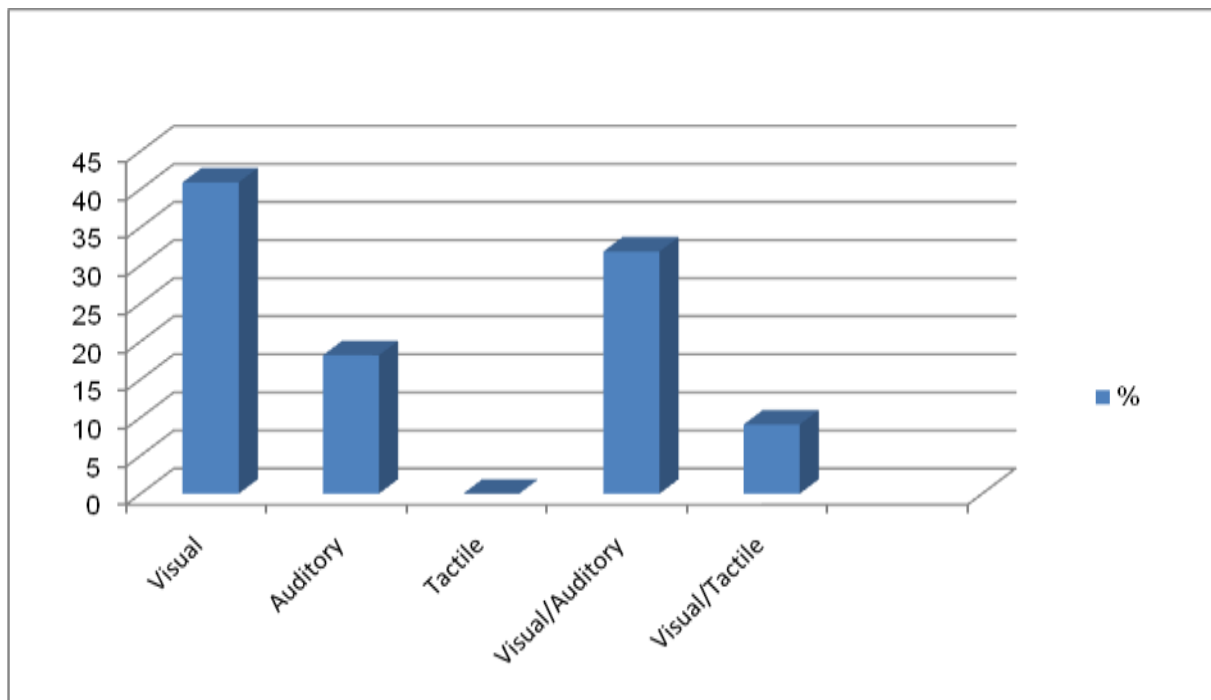


Figure 2: Literature/Civilization Students' Categorization according to the Barsch LSI



According to the findings of the Barsch LSI, most of the students in both groups have a visual style of learning, whether a dominating visual style or in association with another mode, mainly the auditory one. In fact, 34% of the students in the Didactics group (Table 1 and Figure 1) and 40.91% in the Literature/Civilization group (Table 2 and Figure 2) have clear visual mode predominance. Besides, 20% of the participants in the first group and 31.82% in the second one have a combination of the visual mode with the auditory one and an insignificant score difference. On the whole, it is possible to state that the distribution of learning styles is visual, auditory, and tactile, from the most common to the least common one.

**Table 3*****Didactics Students' Scores in the Brain-Dominance Inventory***

Student	A	B	C	Score	Predominant Style	Student	A	B	C	Score	Predominant Style
1	15	15	09	00	bi-lateral	26	15	09	15	-3	S P towards the left
2	08	12	19	+2	S P towards the right	27	16	08	15	-4	M P for the left
3	19	11	09	-8	left-brain dominant	28	16	17	06	+1	S P towards the right
4	14	14	11	00	bi-lateral	29	16	09	14	-4	M P for the left
5	09	13	17	+2	S P towards the right	30	16	04	19	-4	M P for the left
6	06	13	20	+3	S P towards the right	31	16	07	16	-5	M P for the left
7	17	09	13	-4	M P for the left	32	07	16	16	+5	M P for the right
8	14	10	15	-2	S P towards the left	33	10	13	16	+2	S P towards the right
9	13	19	07	+6	M P for the right	34	16	00	13	-3	S P towards the left
10	11	15	13	+2	S P towards the right	35	18	14	07	-4	M P for the left
11	07	09	23	+1	S P towards the right	36	06	13	20	+3	S P towards the right
12	00	11	22	+1	S P towards the	37	11	00	22	-3	S P towards the



	7	0	2		right		3	4	2		left
13	1	2	0	+10	right-brain dominant (s)	<b>38</b>	1	0	1	-3	S P towards the left
	0	0	9				5	6	8		
14	2	1	0	-13	left-brain dominant(s)	<b>39</b>	1	0	1	-2	S P towards the left
	3	0	6				3	8	8		
15	0	1	2	+1	S P towards the right	<b>40</b>	2	0	0	-14	left-brain dominant(s)
	8	0	1				2	8	9		
16	1	1	0	-4	M P for the left	<b>41</b>	1	1	1	+1	S P towards the right
	7	3	9				3	4	2		
17	1	1	1	+2	S P towards the right	<b>42</b>	1	1	1	+1	S P towards the right
	1	5	3				1	3	5		
18	0	1	2	+1	S P towards the right	<b>43</b>	1	1	1	00	bi-lateral
	8	1	0				1	1	7		
19	1	1	1	-3	S P towards the left	<b>44</b>	1	0	2	-2	S P towards the left
	6	1	2				1	7	1		
20	0	1	1	+6	M P for the right	<b>45</b>	1	1	1	-3	S P towards the left
	6	8	5				6	0	3		
21	1	1	1	-3	S P towards the left	<b>46</b>	1	0	1	-1	S P towards the left
	5	0	4				2	9	8		
22	1	0	2	-2	S P towards the left	<b>47</b>	1	0	2	-2	S P towards the left
	1	6	2				0	6	3		
23	1	0	1	-3	S P towards the left	<b>48</b>	1	0	1	-2	S P towards the left
	5	9	5				4	8	7		
24	1	0	2	-1	S P towards the left	<b>49</b>	1	1	1	+1	S P towards the right
	0	9	0				0	1	8		
25	0	0	2	00	bi-lateral	<b>50</b>	1	1	0	+5	M P for the right
	9	9	1				4	9	6		

**A:** number of a's chosen  
**B:** number of b's chosen  
**C:** number of c's chosen

**S P:** slight preference  
**M P:** moderate preference

**Table 4**  
*Literature/Civilization Students' Scores in the Brain-Dominance Inventory*

Student	A	B	C	Score	Predominant Style	Student	A	B	C	Score	Predominant Style
1	15	11	13	-2	S P to the left	<b>12</b>	10	14	15	+2	S P to the right
2	07	20	12	+7	right-brain dominant	<b>13</b>	22	15	22	+2	S P to the right
3	13	12	14	-1	S P to the left	<b>14</b>	44	09	16	-3	S P to the left
4	16	08	11	-4	M P for the left	<b>15</b>	18	14	07	-4	M P for the left
5	06	16	17	+4	M P for the right	<b>16</b>	13	19	07	+6	M P for the right
6	11	06	22	-2	S P to the left	<b>17</b>	22	07	00	-3	S P to the left
7	11	10	18	-1	S P to the left	<b>18</b>	22	10	07	-1	S P to the left
8	13	10	16	-2	S P to the left	<b>19</b>	11	09	19	-1	S P to the left
9	23	10	06	-13	left-brain dominant(s)	<b>20</b>	07	20	12	+7	right-brain dominant
10	12	06	21	-2	S P to the left	<b>21</b>	55	08	16	-4	M P for the left
11	11	10	18	-1	S P to the left	<b>22</b>	99	11	09	-8	left-brain dominant

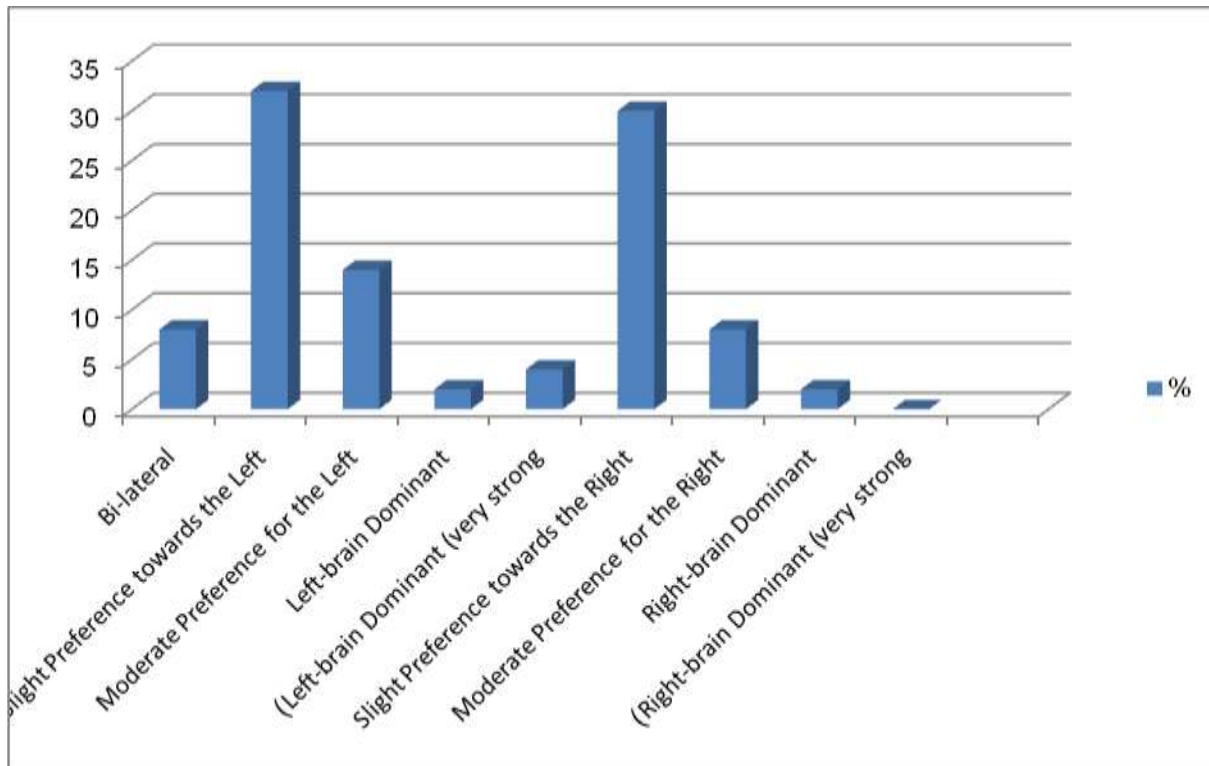


Figure 3: Didactics Students' Categorization according to the Brain-Dominance Inventory

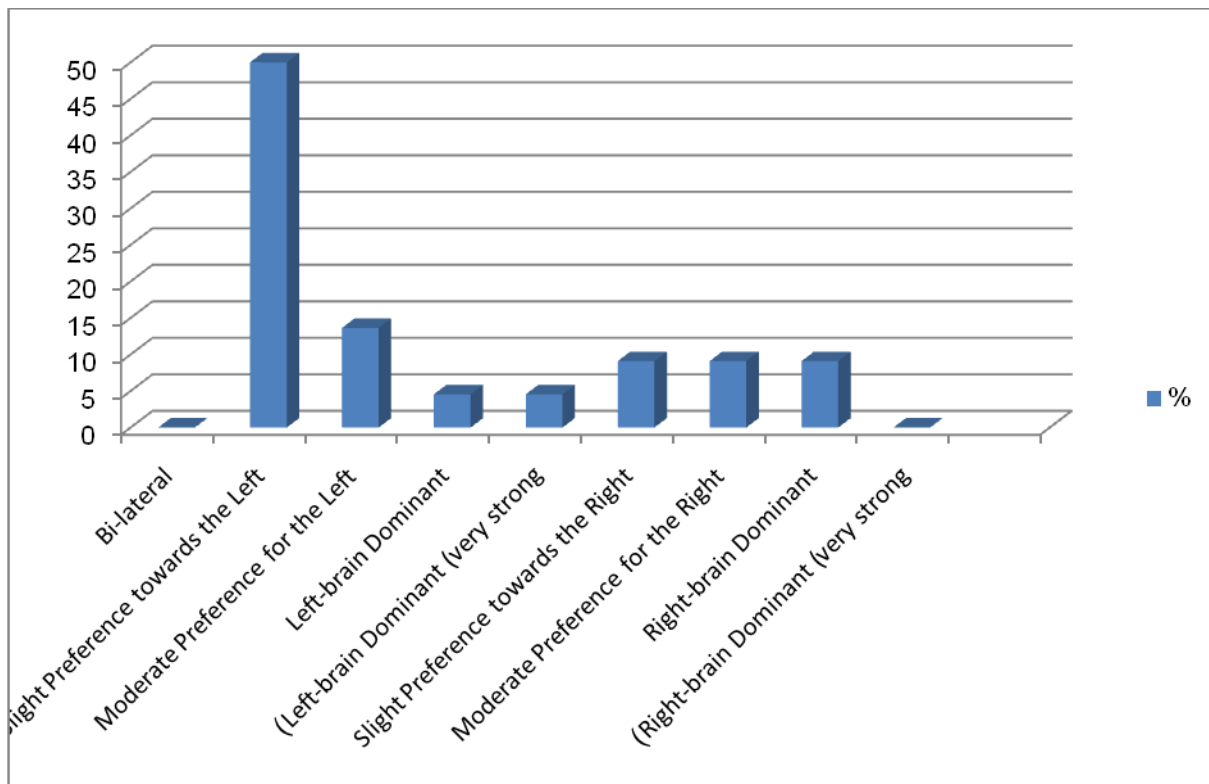


Figure 4: Literature/Civilization Students' Categorization according to the Brain-Dominance Inventory

The Brain-Dominance Inventory results show that 62% (32%+30%) of the respondents in the Didactics group (Table 3 and Figure 3) and 59.09% (50%+09.09%) in the Literature/Civilization group (Table 4 and Figure 4) are classified in the "slight preference" category, whether towards the left or the right, with higher scores for the former, particularly in the Literature/Civilization group. Accordingly, it is possible to say that actual left- or right-brain dominance is restricted to few individuals: 08% in the Didactics group (02% left-brain dominant; 04% left-brain dominant – very strong –; 02% right-brain dominant; and 0% right-brain dominant – very strong –) and 18.19% in the Literature/Civilization group (04.55% left-brain dominant; 04.55% left-brain dominant – very strong –; 09.09% right-brain dominant; and 0% right-brain dominant –very strong –).

### **Adapting Teaching to Learning Profiles**

There are several pedagogical implications worth considering in this account. To begin with, faculty need to differentiate instruction not only by complexity or other factor but also by learning style. Variety and flexibility are the keys when it comes to catering for learning styles. Lesson presentation may be both verbal and visual together with some hands-on demonstration to fit all three learning modes. In other words, teachers should provide learners with opportunities to experience diverse sensory experiences that stimulate different styles in order to boost learning. In ideal situations, instructors identify the dominant style patterns in their classes and adapt their teaching method and content accordingly.

Visual learners learn with their eyes. Accordingly, teachers can use materials or resources that are viewed or read: boards, posters, pictures, drawings, books, videos, diagrams, graphs, maps and written notes. In addition, assignments should be written and so should be the teacher's feedback. Auditory learners learn with their ears. Hence, instructors have to adopt a teaching-by-talking methodology: They have to provide them with materials or resources that are heard like lectures, oral explanations and instructions, group or class discussions, student presentations and audio-tapes. Interviewing (questioning), brainstorming and storytelling are strategies of equal importance and relevance. Tactile learners learn with their hands or 'hands-on'. This learning mode entails the resort to touchable materials like realia. Learners should be given the opportunity to manipulate these objects while performing tasks. Besides, tactile students cannot usually keep still for a long time; that is why it would be a good idea to plan a break or more in every lesson, and to design some physical activities and field trips on a regular basis. Teachers may even consider allowing these students to move around while thinking. Demonstration, role-playing and writing notes down are also recommended activities.

Varied learning modalities can be met through the resort to technological means as Computer-Assisted Language Learning and more importantly the Internet. The latter comprises printed materials and non-print (audio-visual) materials and can be said to be a source of multiple intelligences. Instructors can implement various techniques such as slide presentations, audio and video materials, computer-based text with sound and animation in order to match the students' needs.

The teacher may help students uncover their personal learning style(s) using inventories as those implemented in the framework of this work. This procedure is very useful to students as

it enables them to understand better the way they learn, which would foster their “learning how to learn” skill. In other words, when learners develop an awareness of their own learning preferences, they can recognize their strengths and weaknesses, and work accordingly to enhance their potential for learning and make faster progress. Besides, they would feel better about themselves, more self-confident and more in control (Pritchard, 2009), and hence would stay motivated. EFL teachers can introduce students to individual differences in learning styles through the use of the interactive activity “Find Someone Who”, with which most of them are familiar. Relevant instances that could be included are: “Find Someone Who reads something almost every day” (a visual person); “Find Someone Who listens to music frequently” (an auditory person); “Find Someone Who likes to do things with his/her hands such as building models” (a tactile person). Students’ interaction should be followed by a discussion with the teacher for a better understanding of these learning channels.

It is important for instructors to identify their own learning preferences via an LSI. Teachers’ learning preferences influence their teaching strategies which, in turn, have a direct impact on students’ learning. Knowing about their own learning profile helps teachers reflect upon the choices they make and the techniques they implement in the light of the learners’ differences. Teaching learning strategies is another important procedure that enables students to learn effectively whatever the style adopted by the teacher (Oxford, 1990). These strategies would assist them to face challenges and to experience other channels of learning and develop them.

Likewise, assessment techniques should consider the learners’ various styles. This could be achieved by giving students the opportunity to respond in a range of ways. Instead of tests based solely on reading and writing, faculty could design alternative tests centred on listening and speaking, or reading and interacting/performing. Students may be asked to respond to an exam question through an oral presentation, a diagram, a creative piece of writing, or some other form of knowledge application. It should be remembered that the exclusive reliance on traditional pen-and-paper testing, as it is the case in Algerian schools and universities, is advantageous to visual learners.

Regarding hemisphericity, instructors are, similarly, required to vary their techniques. With left-brain learners, the teacher is supposed to apply the discovery problem-solving approach through the use of, for instance, true/false statements, multiple choice questions and matching exercises. Detailed explanations based on logic, analysis and the use of graphs, charts and tables, reading and writing assignments are all recommended. The traditional lecturing approach is equally suitable to this type of learners (Kinsella; as cited in Kang, 1999) since it allows for the linear, sequential processing of input. It is preferable that teacher-learner relationship be formal, and students’ correct performance be recognized.

Students with a right-brain preference need other instructional strategies. At the outset, they should be provided with clear explanations of the points making up a lesson as a whole. Problem-solving exercises and graphic information are to be used with caution, and are to be simplified whenever used. Instead, social-oriented activities as role plays, dialogues, expressing opinions, group works and projects are welcome. The teacher is primarily conceived of as a

facilitator who supports learners and caters for the appropriate environment for learning to take place.

As to bi-lateral learners and those with a slight preference either to the left- or the right-brain hemisphere, they use functions of both hemispheres in a more or less equal fashion. Even right- or left-brain dominant learners should be assisted to develop a flexible use of both hemispheres. This may be possible through diversifying classroom practices in a way that activates the learners' different skills and faculties. It should be remembered that the brain operates in a highly intricate way, and recent research evidence suggests that viewing the brain as two halves is not really accurate, for its two hemispheres work jointly as well as independently (Curran 2008).

### Conclusion

University teachers need to understand the diversity in students and address it in their daily classroom practices. This might be easier said than done, for it seems to be a challenging task, especially in classes of forty or more students, or in large amphitheatres, as is the case in the Algerian university context. To cater for individual learning profiles and needs, teachers are required to vary their teaching/testing approaches, to balance classroom activities, to provide alternatives. This would, no doubt, make a huge difference in their students' learning.

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