THE EFFECT OF USING BRAIN-BASED TEACHING STRATEGIES ON FIELD-DEPENDENT AND FIELD-INDEPENDENT EFL LEARNERS' AUTONOMY

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ABSTRACT

The current study attempted to explore the effect of brain-based teaching strategies on Iranian EFL learners' autonomy with different cognitive styles. The initial participants of the present study included 120 Iranian female EFL learners at the intermediate level with the age range of 15-24. These 120 learners were given Preliminary English Test (PET) and the scores were used to select only those learners whose scores fell within the range of +/- one standard deviation from the mean. To this end, 90 learners were selected. The 90 selected learners were then given Group Embedded Figures Test (GEFT) and the results were used to choose a sample of field-dependent and independent learners. Based on the results of GEFT, 35 learners were identified as field-dependent and 30 as field-independent. The rest of the learners were identified to have mixed tendencies and discarded. Next, the field-dependent and independent learners were given learner autonomy questionnaire as pretest. Following that, the field-dependent and independent learners were treated with brain-based teaching strategies in two separate groups. After the treatment, the autonomy questionnaire was administered to both groups as posttest. The results of independent samples t-test indicated a significant difference between the mean of the posttest scores with field-independent language learners outperforming the field-dependent ones in terms of autonomy. It can be concluded that field-independent learners can receive more autonomy utilizing brain-based teaching strategies .

KEYWORDS: Brain-based teaching strategies, Cognitive style, Field dependent/independent learners, Learner autonomy

INTRODUCTION
Learner Autonomy
One of the main aims in the context of education is to assist learners to grow autonomous. The majority of instructors seek to offer their students a certain degree of autonomy. The literature indicates that the scholars have increasingly been focusing on autonomy in language learning

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during last decades of the 20th century (Little, 1991). Moreover, learner autonomy has been the focus of many studies recently(e.g., Alibakhshi, 2015; Ceylan, 2015; Koban-Koç, & Koç, 2016; Merç, 2015; Mohammadi, & Moini, 2015; Nakata, 2014; Ok, 2016; Pichugova, Stepura, & Pravosudov, 2016; Salehi, Ebrahimi, & Shojaee, 2015; Talley, 2014). Improving the learners' autonomy can be achieved in different ways and different teaching contexts (Ceylan, 2015). As Talley (2014) states the modern education has introduced new theories and approaches to remove the shortcomings of the traditional learning, with the aim of improving the quality of instruction. Considering the importance of learner autonomy, instructors need to plan for a new innovative step whereby they can improve the quality of learning in the 21st century (Nakata, 2014).

Holec (1979) notes that a well-known definition of autonomy is the people's ability to take responsibility for their own learning. Researchers have considered autonomous learning as a construct which is more appropriate in Western educational environment than in Asian contexts (Lamb, 2004). For instance, Wakui (2006) asserts that students in the Asian context do not display enthusiasm to pose challenges to the authority of their teachers. They are also reluctant to pass on their control to students. However, it seems that this view is superficial so that it is not helpful to jump to conclusion that autonomy is not a suitable concept in Asian classes (Ok, 2016). As pointed by Littlewood (1999), both Asian students and western students enjoy the same capacity for autonomy, with some instructors reporting that their efforts in enhancing autonomy in Asian learners bore fruits.

Field-dependent/Independent
In the case of the traditional teaching, learners are required to rush through a basic curriculum earmarked for them so that they are all considered to be homogenous in terms of learning styles (Haimes - Bartolf, 2006). Their typical learning styles are not taken into account. This results in boredom and underachievement. Among different learning styles, two important cognitive styles include field-dependence and field-independence (Alharthi, 2015).

In the view of Wooldridge (1995), field-dependent persons are interpersonally oriented, making extensive recourse to external stimuli. Consequently, these individuals prefer being open to others' ideas and attitudes. They also suffer from short attention spans and thus they can be easily distracted (Khatib & Hosseinpur, 2011). Wooldridge maintains that field-dependent learners like casual instructional circumstance where they can express their feelings and experiences (Davis, 2006).

As Davis (2006) maintains, field-dependent learners are less achievement-oriented and less competitive than filed-independent students while field-independent people prefer being more independent and it seems they are more task-oriented while learning (Haimes-Bartolf, 2006). These people are more concentrated and disciplined, enjoying longer attention span. As discussed by some scholars, field-independent people rely more on internal cues. They prefer more formal settings for learning. Thus, it can be said that they are more effective and achievement oriented students (Witkin & Goodenough, 1980; Witkin, Moore, Goodenough, & Cox, 1975; Witkin, Oltman, Raskin, & Karp, 1971; Wooldridge, 1995).

In the view of Haimes-Bartolf (2006), when it comes to the differences between field-dependent and field-independent individuals, the way in which learning or memory process happens rather than in how effective that process is in question. The results of the experiment conducted by Davis and Frank showed that the short-term memory in field-independent students outperformed the field-dependent people in the circumstances of high information load and the case of potential.

Brain-based Teaching

Learners' active engagement in the teaching-learning process is regarded as a factor contributing to the enhancement of the quality of education (Saleh, 2012). As Kaufman et al. (2008) maintain, EFL practitioners need to apply those techniques to their teaching-learning process with the aim of creating interest among the students. In other words, the process should be student-centered rather than teacher-centered (Jensen, 2007). Brain-Based Teaching Approach (BBTA) is viewed as one of the kinds of such learner-centered teaching methods, using students' cognitive endowments (Caine & Caine, 2002).

Educationalists should use nontraditional pedagogical approaches including brain-based teaching to incorporate the needs of these learners (Sousa, 1998). Contrary to the traditional schooling, which is often claimed to limit learning by disregarding the brain's natural learning processes, the Brain-Based Teaching Approach (BBTA) boosts learning because of its holistic approach towards the learners (Caine & Caine, 2002). This approach of learning focuses on the brain's best natural operational principles, with the aim of inducing maximum attention, understanding, meaning, and memory (Jensen, 2007).

As Kaufman et al. (2008) maintains, meaningful learning is achieved when faculty is going from a teacher-centered context to one that is learner-centered. The learner-centered context requires the educators to enhance learners' awareness of course content by making the classroom environment rich to incorporate physical, emotional, and social dimensions (Jensen, 2007). It adjusts the local point of the classroom from teaching to learning (Kaufman et al., 2008). Brain-based teaching approach combines the following factors (Sousa, 1998):
- involvement of emotions
- enriched environments
- music
- movement
- meaning making and the absence of threat for maximum learner participation and achievement

As an educational approach based on research in neuroscience, BCL (Brain-Compatible learning) is concerned with how the brain naturally learns best and the learning strategy resulting from this strand of research can easily be combined with any learning environment (Saleh, 2012).

Caine and Caine (2002) mention three elements including Relaxed Alertness (RA), Orchestrated Immersion (OI) and Active Processing (AP). As they put it, in order to make the learning environment relaxed, the teacher can create a high level of rapport with students by taking a

22

International Journal of Language Learning and Applied Linguistics World
(IJLLALW)

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friendly approach. As for orchestrated immersion Caine and Caine (2002) believe that the instructors can take various measures including interesting, exciting, and motivating activities in the process of teaching. As Caine and Caine (2002) state, the learning environment should be interesting, rich, practical and full of hands-on activities for orchestrated learning to take place. Thus, the instructors should incorporate interactive and information-gap activities. Concerning active processing Caine and Caine (2002) assert that students' real life experiences should be embedded in the lessons and become the focus of attention. To do so, learners can be encouraged to think of events similar to the themes of the lesson and relate them to their classroom activities.

A review of the previous studies on brain-based teaching (Demýrhan, Onder, & Beboluk, 2014; Saleh, 2012; Siercks, 2012), learner autonomy (Lamb, 2004; Little, 1991; Sakai & Takagi, 2009; Wakui, 2006) and field-dependence/independence (Alharthi, 2015; Davis, 2006; Dörnyei & Skehan, 2003; Ehrman & Leaver, 2003; Khatib & Hosseinpur, 2011) indicates that to date, to the best knowledge of the researcher, no study has attempted to investigate the effect of using brain-based teaching strategies on field-dependent and field-independent EFL learners' autonomy which is the focus of the current study. Thus, the present study sought to investigate the following research question:

RESEARCH QUESTION
Is there a significant difference between the impact of brain-based teaching strategies on field-dependent and field-independent EFL learners' autonomy?

METHODOLOGY
Participants
The initial participants of the present study included 120 Iranian female EFL learners at the intermediate level. These participants were selected based on convenience sampling since pure randomization was not possible for the researchers. They were all studying English at a private language institute in Tehran and due to the fact language schools need to be gender specific based on education policy of the minister of education only female participants were available to the researchers. The participants' age ranged from 15 to 24. The 120 learners were given Preliminary English Tests (PET) and the scores were used to select only those learners whose scores fell within the range of +/- one standard deviation from the mean. To this end, 90 learners were selected. The 90 selected learners were then given Group Embedded Figures Test (GEFT) and the results were used to choose a sample of file-dependent and independent learners for the purpose of the following study. Based on the results of GEFT 35 learners were identified as field-dependent and 30 learners as field-independent. The rest of the learners were identified to have mixed tendencies and were discarded. Thus, there were two groups of participants in the present study. Apart from the main participants of the study a group of 30 learners having similar characteristics to the main participants were also used for piloting PET.

23

International Journal of Language Learning and Applied Linguistics World
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Instruments

The current study made use of three measures, two of which were for selecting the participants of the study and the other one was for measuring the learners' autonomy. To be more specific, PET was used to assess the overall language proficiency of the learners and GEFT for identifying learners as field-dependent or field-independent. In order to measure the learners' autonomy, a learner autonomy questionnaire was utilized. Each of these instruments are described below:

Preliminary English Test (PET)

A proficiency PET was administered to the initial 120 participants to select a homogeneous sample in terms of language proficiency for the purpose of the present study. The Preliminary English Test, or PET for short, is a test in English as a Foreign Language developed by Cambridge ESOL. The test has these sections:

- Reading Writing are taken together - 90 minutes
- Listening - 30 minutes
- Speaking - an interview, 10 minutes

To make sure that PET was appropriate for the context of the current study, it was piloted on 30 female intermediate learners from the same language institute and Cronbach's alpha was run on the scores. The Cronbach's Alpha index obtained was 0.78 which was considered satisfactory.

GEFT

In order to identify learners as field-dependent or field-independent, the GEFT (Group Embedded Figures Test) was employed. GEFT is a visual test with multiple choice format developed by Witkin, Oltman, Raskin and Karp (1971). The test contains 18 items and in each item respondents need to analyze the complicated figures and find the one that contains the simple figure. The simple figure is first shown to the respondents and then they are asked to find it embedded in the given complicated figures. GEFT also has seven beginning figures for the purpose of practice and familiarizing students with the test. The maximum possible raw score would be 18: the score is obtained by adding the correct number of responses. There is no penalty for wrong answers. A high score (12-18) means that the candidate could separate the simple figure from the complex figure and has tendencies considered to be FI. The converse is true for those who have low scores (0-7) on the test and they are considered to be FD. Candidates with mid-level scores (8-11) are considered to have mixed tendencies. With regard to the reliability of the test Witkin, Oltman, Raskin, and Karp (1971) reported a reliability of 0.82.

Learner Autonomy Questionnaire

The main variable of the study was learner autonomy which was measured by administering the Learner Autonomy Questionnaire developed by Zhang and Li (2004). This is a standard test, comprising two parts and totally 21 items. The first part contains 11 statements and respondents should show their agreement with the statements by choosing one of the options (never, rarely, sometimes, often, and always). The second part contains 10 incomplete sentences and respondents need to choose one of the five options to complete the statements. The total score of each person on the learner autonomy scale could range from 21 to 105. Nematipour (2012) reported a high level of reliability for the Learner Autonomy Questionnaire (r=0.88).

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Procedure

The procedure of the study consisted of two parts; 1) the selection process of the participants and 2) the experimentation part. In the first part, it was tried to find an adequate number of homogeneous participants in terms of overall language proficiency. To this end, initially, 120 female participants at the intermediate level of language proficiency were spotted and got to take the PET. The participation was voluntarily; however, they were encouraged to participate in the study by being promised that they would receive the results of PET and their autonomy status. Based on the results of PET given to the initial 120, ninety learners whose scores fell within the range of +/- one standard deviation from the mean were selected. These 90 learners were then given GEFT. Based on the results of GEFT, 35 learners scoring 12 to 18 were identified as field-dependent and 30 learners scoring 0 to 7 as field-independent. The rest of the learners scoring within the range of 8 to 11 were identified to have mixed tendencies and discarded.

In the second part of the study, the 65 selected learners completed the learner autonomy questionnaire as pretest and both groups i.e. the 35 field-dependent and 30 field-independent learners underwent brain-based teaching strategies and again completed the learner autonomy questionnaire as posttest after the treatment. With respect to brain-based teaching three core elements of brain-based teaching in line with Caine and Caine (2002) were observed while teaching the main lessons of the English language course. The three elements were Relaxed Alertness (RA), Orchestrated Immersion (OI) and Active Processing (AP). In order to make the learning environment relaxed, the teacher created more rapport with students by taking a friendly approach. The students were treated with emphasized respect and they were persuaded to be relaxed and express their opinions freely. To this end, the first two sessions of the course were mainly introduction and rapport creating steps. The same approach continued throughout the term but with less emphasis so that other aspects of the course could not be ignored. As for observing the orchestrated learning, various interesting, exciting, and motivating measures were taken. According to Caine and Caine (2002) the learning environment should be interesting, rich, practical and full of hands on activities as ways for orchestrated learning. Accordingly, the interactive and information-gap activities were further emphasized and there were more game activities in the classroom. Occasionally, video clips related to the topics of lesson were also shown and discussed. With regard to active processing, students' real life experiences were related to the topics of the lessons. To do so, the learners were encouraged to think of similar events in their life and relate them to their classroom activities. Sometimes role playing was used in the classroom particularly with functional use of language like invitation, refusal etc.

The above procedure was employed in both groups. After the language course which lasted for 12 sessions of 90 minutes finished, the participants completed the learner autonomy questionnaire as posttest. The total autonomy score of each participant was computed and made ready for analysis. Data analyses were performed by the help of SPSS 21 and using the statistical technique of independent samples t-test before and after the treatment.

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RESULTS AND DISCUSSION

In order to homogenize the participants of the study in terms of their language proficiency prior to the treatment, it was first needed to check their language proficiency by administering PET. After piloting the test, PET was administered to 120 learners based on which 90 learners whose scores lay within the range of +/- one standard deviation were selected. Table 1 shows the descriptive statistics of PET scores for the initial 120 learners.

Table 1: Descriptive Statistics of 120 Students on PET

Variables	N		Mean	Std. Deviation	Minimum	Maximum
	Valid	Missing				
PET	120	0	53.38	8.423	42.00	56.00

The mean score of the sample was 53.38 (SD=8.423), with the minimum score of 42 and maximum score of 56. Those students with scores below and beyond ±1SD from the mean were removed leading to the selection of a homogeneous group of 90 learners in terms of language proficiency. Next, the 90 selected learners were given GEFT. The results of the test showed that there were 35 as field-dependent and 30 learners as field-independent. The field-dependent and independent learners were then put into two separate groups and learner autonomy questionnaire was given to them as pretest. Then, to make sure that there was no significant difference between the two groups in terms of learner autonomy prior to the treatment, an independent samples t-test was run on the learner autonomy scores of the two groups. Table 2 indicates the descriptive statistics of the learner autonomy pretest scores of the two groups.

Table 2: Descriptive Statistics of the Pretest Autonomy Scores of Field-dependent and Independent learners

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Pre-test autonomy	FD	35	40.6000	3.53304	.59719
	FI	30	41.9000	3.00975	.54950

As presented in Table 2, the mean score for the pretest of field-dependent and independent learners is 40.60 and 41.90, respectively. To see whether the difference in the means of the two groups was significant, an independent samples t-test was run on the pretest scores of the two groups. Table 3 displays the respective results.

Table 3: Independent Samples T-test for the Pretest Scores

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pre-test autonomy	Equal variances assumed	1.172	.283	-1.5	63	.119	-1.30000	.82168	-2.9419	.34199
	Equal variances not assumed			-1.6	62.999	.114	-1.30000	.81154	-2.921	.32173

As indicated in Table 3, the significance value equals .114 which is higher than the significant level of 0.05 and thus it can be inferred that the two groups were not significantly different in terms of learner autonomy prior to the administration of the treatment. After making sure that, there was no significant difference between the two groups in terms of learner autonomy, the treatment was given to both groups. After the treatment was over, the learner autonomy questionnaire was given to both groups as posttest. Table 4 demonstrates the descriptive statistics of the autonomy posttest scores.

Table 4: Descriptive Statistics of the Posttest Autonomy Scores of Field-dependent and Independent learners

Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean
Post-test autonomy	FI	35	46.5429	6.07474	1.02682
	FD	30	42.2000	3.05580	.55791

As seen in Table 4, the mean for the posttest scores of field-dependent and independent learners is 42.2 and 46.54, respectively. To see whether the difference in the means of the two groups was significant and independent samples t-test was run on the posttest scores of the two groups. Table 5 illustrates the respective results.

Table 5: Independent Samples T-test for the Posttest Scores

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post-test autonomy	Equal variances assumed	2.085	.122	3.547	63	.002	4.34286	1.22432	1.89624	6.78947
	Equal variances not assumed			3.716	51.750	.000	4.34286	1.16860	1.99762	6.68809

As shown in Table 5, the significance value is .002 which is lower than the significant level of 0.05 and therefore it can be inferred that the two groups were significantly different in terms of learner autonomy after the treatment. Since the mean for the posttest scores of field-independent learners was higher than that of filed-dependent learners (Table 4), it was concluded that brain-based teaching strategies influenced field-independent learners more that field-dependent learners.

Discussion
The results of the study indicated that brain-based teaching is an efficient method for enhancing the learners' autonomy of field-independent learners more than field-dependent ones. In other words, the autonomy scores of the field-dependent were enhanced from 41.90 to 42.20 and the autonomy scores of the field-independent learners from 40.60 to 46.54. But statistical analysis showed that the autonomy enhancement was significantly better in field- independent learners.

27

IJLLALW

Here in this section, it is discussed first how brain-based teaching can enhance the autonomy of the learners in a general sense because significant difference between field-dependent and independent learners in autonomy posttest while they were equal in pretest is an indication of the positive effect of brain-based teaching on autonomy enhancement, too. Secondly it is discussed how learners with field-independent learning styles can benefit more from brain-based teaching.

This finding can be justified on the ground that brain-based teaching can stimulate motivation and consequently contribute to learners' autonomy though more to field-independent learners. One of the things that make the learners motivated and keep them motivated is the interest and excitement learners find in a particular activity. As it was clear both in the definition of brain-based teaching and also in the way it was operationalized in the current study, interest, excitement, practical and meaningful activities are the essential elements of brain-based teaching. All these elements are keys to motivation (Ng & Ng, 2015) and without motivation, autonomy may not be achieved. In other words, it may not be sensible to think of an autonomous person without having interested in doing a task. The link between the autonomy and motivation was expressed by (Dickinson, 1995). The fact that brain-based teaching enhanced learner autonomy is in line with the argument that autonomy needs to be enhanced rather than to be taught (Benson, 2013). The results of the current study are also in line with the study by Oghyanous (2017). In her study, she found the significant effect of brain based teaching on Iranian learners' self-efficacy. Self-efficacy by definition is closely related to autonomy as self-efficacy is defined as people's perception of their capability in organizing and executing ways to reach achievement (Bandura & Schunk, 1981). In other words, learners should believe themselves so that they can self-regulate their learning and act autonomously to reach achievement.

Moreover, the fact that brain-based teaching strengthened the learners' autonomy further supported the efficacy of brain-based teaching in education, in general and language education, in particular. If learner autonomy is a step towards achievement in learning (Dickinson, 1995), therefore, it can be argued that the current study supported the effectiveness of brain-based teaching in learning as claimed by Caine (2002; 1991), and Jensen (2007). As another piece evidence supporting the positive role of brain-based teaching is the study by Saleh (2012) which showed the effectiveness of brain-based teaching in students' scientific comprehension of Newtonian Physics. Although, the study by Saleh (2012) did not involve language learning, it can be argued that brain-based teaching was in line with general principals of human learning as claimed by Caine (2002).

Based on the results, field-independent language learners scored significantly higher in the autonomy scale than field-dependent learners which means that brain-based teaching is more suited to learners with field-independent learning style. This finding was not far from the expectations as the field-independent learners have characteristics that make them more apt to be independent and autonomous. Field-independent learners act more independently as they are more task-oriented, focused, and disciplined which are the qualities needed for autonomous learning. Because an autonomous learner is the one who has the ability to take responsibility of their own learning (Holec, 1979). On the other hand, field-dependents are more interpersonally-oriented who are in need of external resources which make them less autonomous in learning. In

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addition, literature suggests that cognitive style makes a difference in the learning performance of the individual (Shi, 2001, Sadeghi, et al., 2012; Littlemore, 2001) which was quite in line with the findings of the current study. Pithers (2002) also listed the characteristics of the field-dependent and field-independent teachers among which he pointed to the fact field-independent teachers act more independently while field-dependent teachers were more dependent on authorities.

CONCLUSION
Various implications can be envisaged after considering the results of the study. The most immediate one is to consider the use of brain-based teaching as a potentially positive method for teaching foreign languages and also as a way for autonomy enhancement in language learners particualry for those who are field indepdent. It is of most importance that learners take the responsibility of their learning because unless they do not take this responsibility, there is no way to learn (Trebbi, 1990). However, it should be mentioned that more similar studies in various teaching contexts are needed to firmly suggest the use of brain-based teaching as a way to enhance learner autonomy. In addition, the employment of brain-based teaching requires the attention of various people involved in ELT including the administrators, syllabus designers and policy makers. The employment of brain-based teaching may not be achievable unless administrators are convinced regarding the efficiency of its implementation. Accordingly, more research is needed to provide a clearer picture of the efficacy of brain-based teaching in ELT. For instance, it needs to be further studied how students and teachers react to the implementation of brain-based teaching and how it affects various aspects of language teaching like grammar and language skills.

Limitations of the study
The participants of the present study were selected based on convenience sampling since pure randomization was not possible for the researchers. In addition, due to the fact language schools need to be gender specific based on education policy of the minister of education only female participants were available to the researchers. The participants' age ranged from 15 to 24, as the present study was conducted at a private language institute specific to teenagers and adults.

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29

IJLLALW

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30

IJLLALW

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