European Journal of English Language Teaching
ISSN: 2501-7136
ISSN-L: 2501-7136
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.1298912 Volume 3 | Issue 4 | 2018

BRAIN-COMPATIBLE LEARNING: FROM STUDENTS' PERSPECTIVES

Gülten Koşar[i]
Social Sciences University of Ankara
Hükümet Meydanı No: 2 Ulus,
Ankara, Turkey

Abstract:
The objective of this is to investigate young adult learners' perceptions of brain-compatible learning. 27 university preparatory school students aged 18-21 were taught in compliance with brain-compatible learning approach for four months and a half. Subsequent to the intervention, the participants were asked to fill in a questionnaire developed to explore students' perceptions about brain-compatible learning. A semi-structured interview was conducted in order to gain deeper insights into the participants' perceptions of the brain-compatible learning intervention. The findings obtained from the analysis of the quantitative and qualitative data indicate that the participants have positive perceptions of brain-compatible learning and are planning to continue applying brain-compatible learning principles in the ensuring years. The results of this study could prompt researchers and practitioners to implement brain-compatible learning principles in classroom environment and discover students' perceptions of brain-compatible learning among different age groups.

Keywords: brain-compatible learning, perceptions, young adult learners, English language proficiency, attitude change, student success

1. Introduction

A wide array of approaches and methods such as grammar translation method, communicative approach, suggestopedia, counselling learning et cetera have been employed in the realm of English language teaching with a view to facilitating the learning process undergone by learners of English, and foster student learning. Brain-compatible learning is one of those approaches for which a comprehensive definition is provided by Connell (2009): "*Brain-compatible learning can be viewed as techniques gleaned*

[i] Correspondence: email gencoglugulten@gmail.com
This study reports on the partial findings of the PhD dissertation entitled "The Influence of Brain-Compatible Learning on English Language Proficiency of Adult Learners" and authored by the author of this study.

from research in neurology and cognitive science used to enhance teacher instruction … to enhance students' ability to learn using ways in which they feel most comfortable, neurologically speaking". Brain-compatible learning underscores the significance of learning in accordance with how the human brain learns (Caine & Caine, 1994; Hart, 1983; Jensen, 1995, 2000; Sousa, 1998). The starting point of the researchers introducing the approach to the literature, and having contributed to the related literature by the papers they have produced (Akyürek & Afacan, 2013; Bello, 2007; Blackburn, 2009; Caine & Caine, 1994; Duman, 2010; Freeman & Wash, 2013; Getz, 2003; Hart, 1983; Jensen, 2000; Lucas, 2003; McNamee, 2011; Özden & Gültekin, 2008; Rehman, 2011; Saleh, 2011; Sousa, 1998) has been the incapability of traditional teaching methods such as lecturing in increasing student learning.

The last decade of the 20th century, 1990s, has been recognized as the decade of the brain as Lombardi (2008) states that none of the preceding years had witnessed as much information about the human brain as the one reached in the 1990s. Following the initial exposure to what happens in the human brain through the agency of developments in brain imaging technology, researchers have attempted to narrow the gap between neuroscience and education science ((Ansari, Coch, & De Smedt, 2011; Edelenbosh, Kupper, Krabbendam & Broerse 2015; Hruby, 2012; Koch, Timmerman, Peiffer, & Laurienti, 2013; Samuels, 2009). The common conclusion drawn in those studies is that so long as researchers conduct investigation in collaboration with practitoners, it might be likely to accomplish neuroscientificallly informed teaching and learning.

Taking into consideration the principles in brain-compatible learning approach, a linkage could be built between constructivism and brain-compatible learning. Constructivism asserts that knowledge construction is an active process in which newly acquired knowledge is added to the already existing one (Brooks & Brooks, 1999; Peters, 2000), and what is constructed displays variation amongst individuals (Merill, 2008; Tippins, Tobin, & Hook, 1993). The role of individual differences is also underscored in lessons designed in accordance with brain-compatible learning approach. Beside constructivism, the studies on brain-compatible learning might be grounded upon social constructivism. Similar to social constructivists who place emphasis on the impact of social factors on learning (Phillips, 1995, Vygotsky, 1978), brain-compatible learning puts forward the cruciality of using classroom activities entailing cooperation into instructional planning.

Brain compatible learning approach is transferred to classroom environment by integrating brain-compatible learning principles into lesson planning. The principles advanced by Caine & Caine (1994) and Jensen (2000) have been widely employed in the research examining the effect of brain-compatible learning principles on an array of subject areas. The figure below depicts how a brain-compatible lesson is designed.

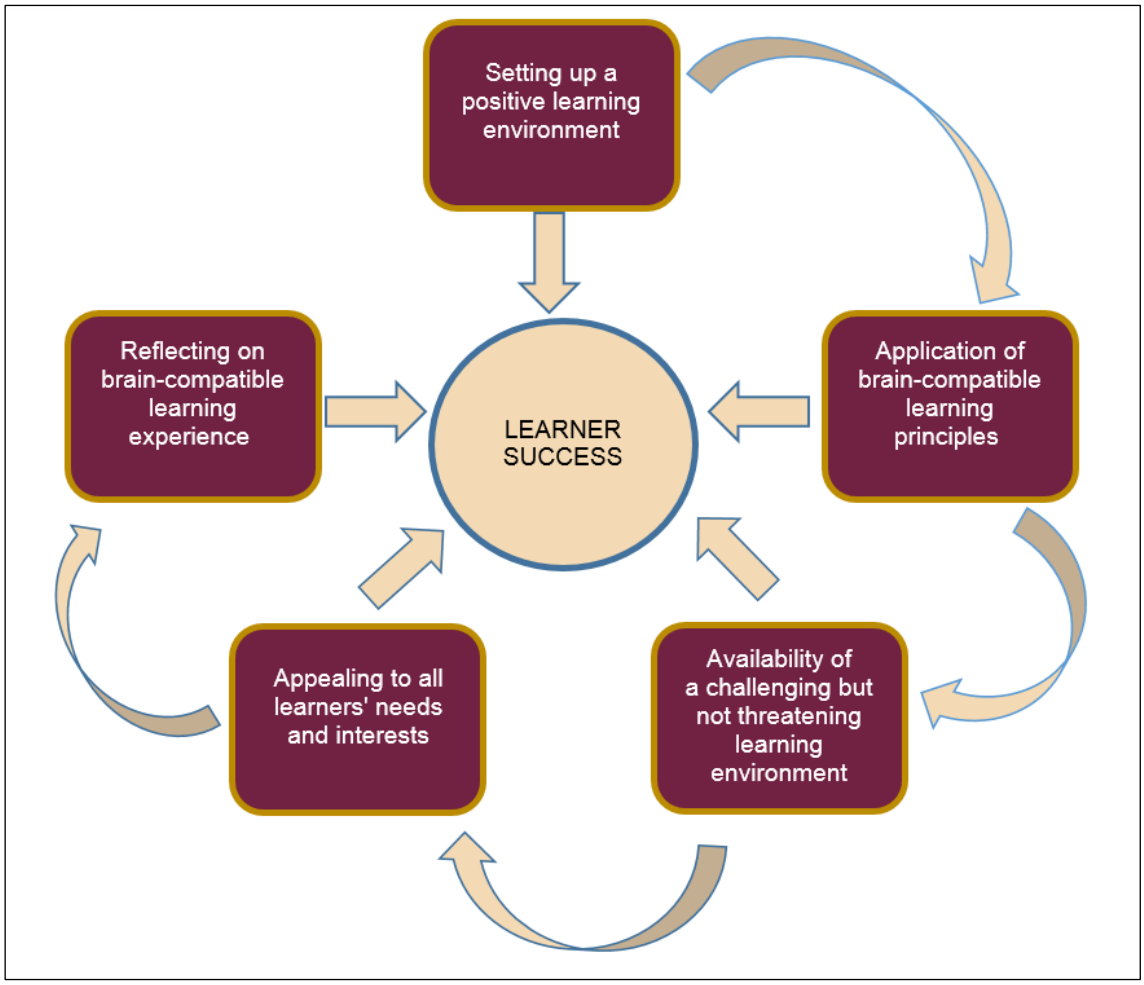

Figure 1: The way a brain-compatible lesson is structured

As demonstrated in Figure 1, the ultimate purpose of a lesson structured in accordance with brain-compatible learning approach is increasing student success. Prior to employing brain-compatible learning principles, a positive learning environment is to be established by making the classroom environment conducive to learning via playing a background music and ensuring that the classroom has sufficient sunlight and oxygen. After setting a safe and comfortable classroom environment, brain-compatible learning principles are integrated into the flow of lessons. Two major contributions of applying brain-compatible learning principles to lessons are establishing a challenging but not threatening learning environment, and addressing students' needs and interests. At the end of a brain-compatible lesson, students are expected to reflect on the brain-compatible learning experience.

Brain-compatible learning has been regarded to be different from traditional teaching methods such as lecturing, and the active role undertaken by the teacher. Barkley & Bianco (2014) assert that teachers teach what they want to teach irrespective of what students want to learn, which might be considered as the fundamental shortfall of traditional teaching methods. Brain-compatible learning, nevertheless, creates a learner-centred environment through the use of a variety of materials, and delivering instruction in a fun and meaningful way (Makurjea, 2003).

Since the literature encompasses limited number of research into investigating the influence of brain-compatible learning on improving student learning in subject areas including English language learning, students' perceptions of brain-compatible learning have not been examined adequately heretofore either. For this reason, this study was carried out in order to seek answers to the research question of what are the perceptions of the students enrolled in a state university preparatory school concerning brain-compatible learning.

2. Literature Review

The related literature entails meagre amount of research exploring students' perceptions of brain-compatible learning, one of which is the study carried out by Avcı & Yağbasan (2010). In that study, 7th grade students were exposed to a training on brain-compatible learning, and an interview was conducted subsequent to the training. The findings attained from the analysis of the participants' responses reveal that the participants had positive views about brain-compatible learning in that they perceived themselves as active learners in brain-compatible lessons. Weimer (2007) conducted research on the middle school students' perceptions of brain-compatible learning. The results of this study report that the students regarded brain-compatible learning as a means of augmenting engaged learning and long-term memory enhancement. One of the purposes of the study done by Duman (2010) was to investigate student-teachers' perceptions of brain-compatible learning. The participants in the experimental group were subjected to brain-compatible learning intervention in measurement and evaluation course while the control group was taught in accord with conventional teaching methods. At the end of the intervention, the experimental group was asked to share their thoughts about the intervention in brain-compatible learning. The findings yield that the participants found the intervention enjoyable and effective.

Besides the studies investigating students' perceptions of brain-compatible learning, a number of studies (Bonnema, 2009; Burkett; 2014; Hodges, 2013; Muscella, 2004; Wachob, 2012; Weimer, 2007) have examined teachers' perceptions of brain-compatible learning. The findings of the research carried out by Muscella (2004) show that teachers perceived brain-compatible learning as an effective means of increasing student success and they were willing to partake in professional development activities to enhance their knowledge of brain-compatible learning with a view to getting learners with disabilities within diverse middle school inclusive classroom to take advantage of brain-compatible learning. Hodges (2013) examined the probable differences with regards to applying brain–compatible learning and years of teaching experience, and teachers' perceptions of brain-compatible learning. The analysis of the data collected by interviewing 23 teachers with varying years of teaching experience shows that there was no statistically significant difference between the level of implementation of brain-compatible learning strategies and years of teaching experience. Nevertheless, the participating teachers reached a consensus on the positive effect of brain-compatible learning on student learning and teachers' need to be trained in employing brain-compatible learning strategies. In line with the findings of the studies done by Muscella

(2004) and Hodges (2013), the results of the study undertaken by Wachob (2012) show that K-12 teachers had positive attitudes towards brain-compatible learning and deepening their understanding of how the brain and learners learn.

3. Methodology

This study based on mixed methods research design aims to investigate young adult learners' perceptions of brain-compatible learning. 27 university preparatory school students aged 18-21 attended 19 hour English lesson every week for four and half months. The lessons were planned in accordance with brain-compatible learning principles introduced by Caine & Caine (1994). Following the intervention, a questionnaire developed by the researcher was administered in order to find out the participants' perceptions of the brain-compatible learning intervention. The questionnaire consisting of 36 items has a five-point likert scale. It was conducted amongst 36 students whose ages differed between 17 and 19 prior to administering the questionnaire with the participants of this study so as to measure its reliability. Table 1 below demonstrates whether or not the questionnaire is reliable by providing the actual value of Cronbach's alpha.

Table 1: Reliability Statistics of Brain-Compatible Learning Questionnaire

N	Cronbach's Alpha Based on Standardized Items	Cronbach's Alpha
36	799	,755

The Cronbach's Alpha value, 755 indicates a high level of internal consistency in the questionnaire. In addition to measuring the reliability of the questionnaire, the items in the questionnaire were read by three scholars and necessary amendments were made in accord with the feedback received from them on the purpose of ensuring the validity of the questionnaire. A semi-structured interview was conducted at the end of the intervention to deepen understanding of the participants' perceptions regarding the intervention in brain-compatible learning. The researcher kept a dairy in which she jotted down the participants' reactions towards the employed brain-compatible principles, what went well or did not go well in due course of applying the principles, and her perceptions of brain-compatible learning principles. As well as the teacher, the participants kept a diary during the intervention in which they wrote their thoughts about the applied principles and to what extent they assisted them as learning English. The extracts from the researcher's and students' diaries will be used in order to support the quantitative data.

4. Findings and Discussion

A questionnaire was administered subsequent to the intervention in brain-compatible learning to unearth participants' perceptions about brain-compatible learning. Table 2 displays the descriptive statistics belonging to each item in the questionnaire.

Table 2: Descriptive Statistics of the Items in Brain-Compatible Learning Questionnaire

No	Item	N	Min	Max	Mean	S
1	I learn better if I am allowed to engage in activities with my body as well as my brain.	27	3,00	5,00	4,5185	,64273
2	Learning becomes meaningful for me as long as I am involved in the learning process	27	3,00	5,00	4,3704	,56488
3	Engaging in collaboration with classmates is a way of stimulating learning	27	4,00	5,00	4,3333	,48038
4	I feel more motivated and learn better if my interests and purposes are taken into account.	27	4,00	5,00	4,7407	,44658
5	Learning English is easier for me if I can link new patterns to what I have already understood.	27	4,00	5,00	4,7407	,44658
6	I feel honoured if my emotions are appreciated by the teacher.	27	3,00	5,00	4,6667	,55470
7	I learn better if I engage in activities with my emotions.	27	3,00	5,00	4,3704	,56488
8	I make sense of learning experiences by paying attention to details alongside the big picture.	27	1,00	5,00	4,0000	1,07417
9	I learn better if my attention is consciously directed to target linguistic elements.	27	1,00	5,00	4,0000	1,07417
10	I internalize the newly transmitted information if adequate time is allocated to reflect on it.	27	3,00	5,00	4,4815	,57981
11	I remember what I listen to and read better if multiple ways such as debates, visuals, songs etc., are utilized to help me remember.	27	3,00	5,00	4,6296	,56488
No	**Item**	**N**	**Min**	**Max**	**Mean**	**S**
12	I learn better if my prior language learning experiences are asked and dealt with.	27	4,00	5,00	4,3704	,49210
13	I feel valued if the teacher keeps in mind that I am different from my classmates.	27	3,00	5,00	4,7407	,52569

14	I don't feel comfortable if I see that what is presented in class is threatening.	27	3,00	5,00	4,6296	,56488
15	I learn better if I am provided with a challenging but supportive learning environment.	27	4,00	5,00	4,5556	,50637
16	I learn better in safe learning environments.	27	4,00	5,00	4,7037	,46532
17	I feel honoured and learn better if my individual abilities are appreciated by the teacher.	27	3,00	5,00	4,5556	,57735
18	I learn better when the teacher provides me with the activities, tasks or projects which are prepared by bearing in mind my individual abilities.	27	3,00	5,00	4,3333	,55470
19	I perform better if the teacher lets me choose the tasks I want to work on from a bundle of activities.	27	2,00	5,00	4,4815	,84900
20	I feel comfortable if I see that what is presented in class is threatening.	27	1,00	5,00	2,3333	1,38675
21	Listening to music during classes distracts my attention.	27	1,00	5,00	2,3333	1,17670
22	I can answer the questions asked by the teacher if I am given time to think after the teacher asks the questions.	27	3,00	5,00	4,5185	,57981
23	I feel more motivated and safer if I am given the chance to choose my seat.	27	4,00	5,00	4,5926	,50071
No	**Item**	**N**	**Min**	**Max**	**Mean**	**S**
24	I can perform better in pair or group activities if I am allowed to choose my partners.	27	3,00	5,00	4,3333	,73380
25	I feel safer and confident if the mistakes I make in classroom are appreciated.	27	3,00	5,00	4,5556	,57735
26	I try to do my best if I take charge of my learning.	27	3,00	5,00	4,3704	,56488
27	I feel honoured and relaxed in classroom environments where I am involved more in activities.	27	3,00	5,00	4,0370	,64935
28	Listening to music during classes makes me	27	2,00	5,00	3,7407	,71213

	concentrate on the assigned task.					
29	Colourful board markers attract my attention more.	27	3,00	5,00	4,1852	,68146
30	I perform better in groups in which members have similar interests and abilities.	27	1,00	5,00	4,1111	1,12090
31	I feel valued, safer and motivated if I am given the opportunity to express my ideas and engage in debates.	27	3,00	5,00	4,3704	,62929
32	I learn better in environments where discussions and debates are promoted.	27	3,00	5,00	4,2222	,57735
33	I learn better if the teacher uses different kinds of techniques in classes such as using video clips.	27	3,00	5,00	4,2593	,59437
34	Chunks are easier for me to remember.	27	2,00	5,00	4,5185	,70002
35	I learn better if I drink water during lessons.	27	2,00	5,00	4,2593	,71213
36	I learn better if I eat snacks such as nuts, apples etc. during lessons.	27	4,00	5,00	4,5556	,50637

As can be seen in Table 2, the mean value for the first item $\bar{x}$= 4,5185 shows that the majority of the focus group participants stated that they learned better if they engaged in learning with their body as well as their brain. The mean value for the second item $\bar{x}$= 4,3704 shows that the participants conceived that engaging in the learning process actively was a means of making learning process more meaningful. The participants' choices for this item varied between 3 and 5. One of the participants wrote down in his diary:

Extract 1: *I was not bored in the lesson because we talked about our best holiday in small groups. Everyone talked. I remembered good old days.*

The third item is included in the questionnaire in order to find out what the focus group participants thought about the stimulating effect of collaborating with classmates. The mean value for this item is $\bar{x}$= 4,3333 and the participants' choices in the likert scale differed between 4 and 5. The standard deviation value for this item S= ,48038 is one of the lowest values amongst the standard deviation values of all the items, which indicates that the participants' responses did not deviate substantially from the mean value. The teacher's diary includes data about the participants' reactions towards collaboration with classmates. Extract 2 provides the researcher's observations about the participants' reactions toward collaboration:

Extract 2: *Today I set up pair and group work activities. The learners were expected to work in groups of four to complete a story the beginning of which was provided under the pictures giving an idea to the learners about the flow of the story. I was amazed by the*

enthusiasm the learners felt when they were on the task. All of them were sharing their ideas with their groupmates in English and they could not be that much happy if they had completed the story individually.

In addition to the teacher's diary, the learners' diaries entail information about the participants' thoughts of studying in collaboration. Extract 3 below is taken from one of the participants' diary.

Extract 3: *I worked in a pair work activity today to do a grammar activity to practise present simple passive. I could not comprehend it well but my friend helped me understand it.*

The fourth item in the questionnaire aims at depicting what the focus group participants thought about the importance of the value given to their interests in learning better and increased motivation level. The mean value for this item $\bar{x}$= 4,7407 shows that almost all of the participants strongly agreed on this item as this is the highest mean value that can be found in the column for mean values. The standard deviation value for this item S= ,44658 is the lowest one in Table 2 when the other standard deviation values are taken into account. The fifth item in the questionnaire provides information about the importance attached by the participants to linking the new patterns to what they already understood. The mean value $\bar{x}$= 4,7407 is the highest mean value and this indicates the common conception among the participants regarding the facilitative effect of associating new patterns with the already stored ones. The minimum option selected by the participants is 4 and the maximum option is 5 and the standard deviation value for this item S= ,44658 indicates that there is no wide variance between the participants' responses in this item. The sixth item targets digging out the participants' perceptions of whether or not they felt honoured when their emotions were valued by the teacher. The mean value $\bar{x}$= 4,6667 depicts that the participants held strong beliefs about the significance of their emotions and the value attached to them.

The seventh item in the questionnaire was added to the questionnaire in order to gather the participants' ideas about whether they learned better so long as they engaged in learning with their emotions. The mean value for this item is 4,3704 and the standard deviation value is ,56488. The participants' choices differed between 3 and 5. The mean value $\bar{x}$=4,3704 shows that the participants are aware of the significance of integrating emotions into learning. The eight item is related to learning by paying attention to details alongside the big picture. The mean vale belonging to this item is $\bar{x}$= 4,0000and the standard deviation value is S= 1,07417. The standard deviation value means that the participants' responses to this item varied greatly from each other. The ninth item is about learning better on the condition that the participants' attention is consciously directed to linguistic items. The mean value for this item is one of the lowest ones $\bar{x}$= 3,5926 and the standard deviation value is S= 1,24836. The standard deviation value shows that the participants do have distinct opinions about learning facilitated by conscious attention to target linguistic items.

The tenth item focuses on the importance of reflection time in order to internalize what is learned. The mean value $\bar{x}$= 4,4815 shows that most of the participants agreed with the item. Since the standard deviation value is S= ,57981, it can be understood that

there is no huge discrepancy between the participants' thoughts about this item. The eleventh item is about the use of different ways such as visuals, songs, debates so on so forth to help the participants remember. The mean value for this item $\bar{x}$= 4,6296 indicates that there was a consensus among the participants on the contribution of making use of different ways to present the new information with a view to helping the participants remember them. During the interview which was conducted in January most of the participants expressed their thoughts about the usefulness of debates. Extract 4 taken from one of the student diaries, provides one of the participants' perceptions of debates.

Extract 4*: I like debates most. We had the chance to choose the topic of the debate and everyone in the class did their best in the debate.*

The twelfth item is involved in the questionnaire in order to find out what the participants thought about to what degree they could learn better whilst their prior language learning experiences were taken into account. The lowest choice selected by the participants in this item is 4 and the highest one is 5. The mean value $\bar{x}$= 4,3704, and the standard deviation value S= ,49210 show that all of the participants either agreed or strongly agreed on this item. In relation to this item one of the participants said during the semi-structured interview:

Extract 5: *I have realized that the English lessons you taught were different from my past English lessons. You asked us about our prior language learning experiences and organized your own lessons differently.*

The thirteenth item in the questionnaire can be linked to the individual differences and the importance of keeping in sight learner differences. The mean value $\bar{x}$= 4,7407 indicates that the participants thought that they learned better providing their teacher took their individual differences into consideration. The fourteenth item is about how important it is to provide a comfortable learning environment as it was integrated into the questionnaire in order to see to what degree the participants were comfortable once the content of lessons was threatening. The mean value $\bar{x}$= 4,6296 indicates the majority of the participants agreed on the conception that they did not feel comfortable once they saw that what was presented in the classroom was threatening. In the learners' diaries, it is possible to encounter sentences expressing how comfortable the participants were during lessons. Extract 6 is one of them:

Extract 6: *I am as comfortable in the class as I am at home.*

One of the questions in the interview that was carried out in January aims at finding out whether or not the classroom environment were comfortable for the focus group participants. All of the participants expressed that they were comfortable in the class and the following words are uttered by one of the participants while articulating her ideas about the comfortable learning environment.

Extract 7: *I am comfortable in the lessons because there is a friendly environment in the class and this is thanks to you.*

The fifteenth item is pertinent to seeing how the participants approached challenging but supportive learning environments. The mean value for this item $\bar{x}$= 4,5556 and the minimum choice 4 and the maximum choice 5 show that the participants

had similar views, though not the same, regarding better learning rooted in challenging, but supportive learning environments.

The sixteenth item concentrates on the cruciality of safe learning environments. The mean value $\bar{x}$= 4,7037 and the standard deviation value S=,46532 are the indicators of the common perception amongst the participants concerning how learning can be improved in safe learning environments. One of the participants stated in the semi-structured interview:

Extract 8: *Safe learning environment is very important because if I do not feel safe, I cannot concentrate on anything.*

The seventeenth item in the questionnaire is about the probable importance given by the participants to the teachers paying attention to their individual abilities. The mean value $\bar{x}$= 4,5556 signifies that the participants felt honoured when teachers took into account their individual abilities. The eighteenth item is associated with activities designed in accordance with learners' individual abilities. The mean value for this item $\bar{x}$= 4,3333 shows that the participants had a tendency to learn better provided that the teacher took into consideration their individual abilities whilst preparing activities, tasks and projects. The nineteenth item in the questionnaire is about allowing learners to choose the tasks they want to work on. The mean value $\bar{x}$= 4,4815 indicates that the participants thought that they performed better as long as the teacher gave them the chance to choose from a bundle of options the tasks, activities and projects they wanted to work on. However, the standard deviation value S= ,84900 and the minimum choice 2 reveal that there were some participants who did not think in line with what is presented in the item. The teacher's diary contains information about the participants' reactions towards having a chance to choose tasks. Extract 9 is a quotation from the researcher's diary:

Extract 9: *My learners feel valued when I ask them on which task they want to work. Today the same thing happened. I asked them to select the passage they wanted to read out of 10 options, yet they offered a passage that was not on the list and the majority agreed on reading that passage.*

The twentieth item was included into the questionnaire to better show what the participants thought about threatening learning environments. The mean value $\bar{x}$= 2,3333 shows that the participants did not feel comfortable in threatening learning environments. The 21st item aims at figuring out whether or not listening to music distracts the participants when they are on a task. The mean value $\bar{x}$= 2,3333 indicates that the majority of the participants were not distracted due to the music played in the background; nonetheless, the maximum choice is 5, as can be seen in Table 33, demonstrates few of the participants considered that music distracted their attention. This can be explained by most of the participants' reactions at the beginning of the study that they were not used to studying and listening to music at the same time. One of the participants wrote in her diary:

Extract 10: *At the beginning I did not think I would be able to focus when music was played but now I ask the teacher to play music when we are on a task.*

Another participant remarked during the interview that he was continuing to listen to classical music when he was studying and would do so in the future, too.

The 22nd item sets forth the concept of wait time needed to be provided after teachers ask a question. The mean value for this item $\bar{x}$= 4,5185 indicates that the majority supported the idea that wait-time should be given after asking a question instead of calling for learners' names immediately to get the answer.

The mean value for the 23rd item $\bar{x}$= 4,5926 and the minimum choice 4 and the maximum choice 5 show that the participants agreed on the motivating power of the provided chance to choose their seats. Item 24 targets revealing what the participants thought about having opportunity to choose their partners in the activities requiring collaboration. The mean value $\bar{x}$= 4,3333 indicates that most of the participants thought that they performed better in the activities in which collaboration with classmates was a prerequisite on the condition that they were given the chance to select their partners.

One of the participants said in the interview in January:

Extract 11: *I feel more comfortable if I work with a friend I choose*.

Item 25 takes its place in the questionnaire to seek what the participants considered about the mistakes being appreciated by their teacher. The mean value $\bar{x}$= 4,5556 shows that an overwhelming number of the participants believed that they felt safer and more comfortable once their mistakes were appreciated. The standard deviation value S=,57735 is a signal of how the participants' responses to this item were close to each other. The content analysis of the interview showed that the participants felt comfortable as their mistakes were appreciated. One of the participants stated:

Extract 12: *When I was at high school, my teacher never tolerated making mistakes but you always welcomed our mistakes and this motivated us more.*

Brain-compatible learning principles and the strategies springing out of these principles manifest a link between brain-compatible learning and independent learning. The 26th item can reveal if the participants did their best when they took charge of their own learning. The mean value $\bar{x}$= 4,3704 indicates a tendency among the participants to study harder when they take control of their learning. In the interview one of the participants said:

Extract 13: *I want to continue applying brain-compatible learning principles because when I apply them, I get control of my learning.*

Item 27 has been involved in the questionnaire so as to find out the participants' thoughts about actively engaging in classroom activities. The mean value $\bar{x}$= 4,0370 indicates that the majority of the participants felt honoured and more comfortable in the classroom when they took part in the classroom activities. The 28th item in the questionnaire reveals better what the participants thought about listening to music when they were dealing with a task. The mean value $\bar{x}$= 3,7407 shows that there were some participants getting distracted by the background music.

The 29th item looks for the participants' thoughts about the use of colourful board markers during lessons. The mean value $\bar{x}$= 4,1852 demonstrates that most of the participants advocated the use of colourful board markers for they helped them better concentrate. Item 30 aims at revealing the participants' perceptions of working with the

classmates with the same interests and abilities. Even though the mean value $\bar{x}$= 4,1111 points out a disposition amongst the participants to work with the classmates with similar interests, the standard deviation value S= 1,12090 and the minimum choice 1 and the maximum choice 5 indicate that the participants' responses to this item differed greatly. The 31st item was added to the questionnaire to figure out the participants' thoughts about the correlation between feeling safer and motivated, and expressing their ideas in the classroom and in debates. The mean value $\bar{x}$= 4,3704 demonstrates that the participants felt safer and motivated when they expressed their ideas in the classroom and in debates. The researcher wrote down her observations in her diary about the participants' reactions towards debates.

Extract 14: *My learners feel safer and motivated when they engage in debates. This was obvious in today' debate because even the learners who do not prefer to talk in lessons actively participated in the debate.*

Item 32 was included in the questionnaire to find out the participants' thoughts concerning better learning that may result from debates and discussions in the classroom. The mean value $\bar{x}$= 4,2222 demonstrates that the participants associated engaging in debates and discussions in the classroom with better learning. The 33rd item targets digging out what the participants' thought about the influence of different techniques used by the teacher on learning. The mean value $\bar{x}$= 4,2593 indicates that the participants viewed different techniques as useful means to foster learning. The standard deviation value S= ,59437 ,indicates that no wide variation among the participants' responses to this item existed. Item 34 searches for the participants' thoughts about chunks. The mean value $\bar{x}$= 4,5185 shows that it was easier for most of the participants to remember by the medium of chunks.

Item 35 was encompassed in the questionnaire to figure out the participants' ideas about drinking water during lessons. The mean value for this item $\bar{x}$= 4,2593 indicates that the participants were in favour of drinking water in the classroom. However, few learners did not support drinking water during lessons. The teacher's diary involves some notes about the participants' compliance with drinking water, which is given in extract 30:

Extract 15: *I drink water in the lessons every day and all of my learners have started to bring bottles of water and drunk it during lessons.*

The last item, item 36, aims at revealing what the participants' thoughts about eating nuts during lessons are. The mean value $\bar{x}$= 4,5556 indicates that the participants all agreed on the positive correlation between learning and eating snacks as the minimum choice is 4 designating agree and the maximum choice is 5 designating strongly agree. One of the participants stated his ideas about eating nuts in the lessons during the semi-structured interview:

Extract 16: *I never ate something when I studied before but now I do. I eat nuts while studying and this motivates me.*

A semi structured interview from which a number of extracts have been provided in order to support the data gathered from the questionnaire was conducted with the participants after the intervention. In the interview, the participants were

asked if their proficiency in English improved after the intervention. At the outset of the study the participants were asked about their level of proficiency in English in the background information questionnaire. Focus group participants' thoughts about their level of proficiency were found out at the end of the intervention by asking in the semi-structured interview the question of what they thought about their proficiency level after being exposed to the brain-compatible learning environment. The participants stated that their level of proficiency in English improved in the last four months during which they were subjected to the brain-compatible learning intervention. However, this answer would make better sense as long as the participants provided explanations regarding the improvement in their level of proficiency. Table 36 displays the frequency values of the focus group participants' explanations recorded during the interview carried out in January.

.

Table 3: Focus Group Participants' Explanations Regarding the Improvement in Their English Proficiency

Category	**N**	**%**
Improvement in four skills	11	40,7
Abolition of grammar-based teaching	4	14,8
Abolition of memorization	4	14,8
Motivating teacher	3	11,1
Attitude change towards English	3	11,1
Comprehension-based lessons	1	3,7
Improvement in speaking	1	3,7
Total	27	100

As shown in Table 3, 40,7% of the participants pointed out that their proficiency in four skills improved due to the brain-compatible learning intervention. Four of the participants highlighted during the interview that their level of proficiency in English improved owing to the abolition of grammar-based teaching in the brain-compatible lessons. Four of the participants stated that it was the abolition of memorization that helped them improve their language proficiency. Three of the participants stated that the teacher conducting the brain-compatible lessons was a motivating teacher and the lessons done by a motivating teacher enabled the improvement in their proficiency level. 11,1% of the participants stated that their level of proficiency in English improved because the brain-compatible lessons changed their attitudes towards English and this enabled them to study harder and comprehend better in enjoyable lessons. One of the participants verbalised that the lessons were comprehension-based lessons and since comprehension was paramount, their proficiency level in English improved during the intervention. One of the participants expressed how the brain-compatible lessons contributed to the improvement in her level of proficiency by mentioning the improvement in her speaking skill.

So as to extend the findings regarding the participants' thoughts about the effectiveness of brain-compatible learning the participants were asked to compare their brain-compatible learning experience with their previous language learning experiences. All the participants stated that the brain-compatible learning intervention

was more effective in terms of their learning in comparison to their past language learning experiences. Table 4 below shows how the participants described their previous language learning experiences, and therefore, can function as a means for sorting out why they perceived the brain-compatible lessons more effective than the lessons they had taken before.

Table 4: The Themes that Emerged Regarding the Participants' Past English Lessons

Category	**N**	**%**
Grammar-based	16	59,3
Memorization	5	18,5
Translation	2	7,4
Mistakes were not welcomed	1	3,7
Reading dominant	1	3,7
Speaking dominant	1	3,7
Course book-based	1	3,7
Total	27	100

As can be seen in Table 4, 59,3% of the participants stated that the previous English lessons were grammar-based. 18,5% of the participants stated that the lessons were memorization-based lessons. Two of the participants verbalized that the lessons were translation-based lessons. One of the participants remarked that learner mistakes were not welcomed in the English lessons she had taken before the brain-compatible learning experience. Another participant noted that improving learners' reading skill was the main objective in her previous English lessons. One of the last two participants stated that his previous English lessons were speaking dominant and the other one denoted that the lessons centred upon covering the units in the selected course book.

One of the primary aims of brain-compatible lessons is to set a comfortable learning environment. The participants were asked the question of how the focus group participants evaluated the comfort of the learning environment whilst implementing the brain-compatible learning intervention was asked with the purpose of digging out the participants' thoughts about how comfortable they were in the brain-compatible lesson. All of the participants stated that they were comfortable in the brain-comfortable lessons. The following question in the interview was directed to the participants to learn about why they felt comfortable in the brain-compatible classes. Table 5 displays the reasons uttered by the participants during the interview.

Table 5: Participants' Thoughts about Why They were Comfortable during the Brain-Compatible Lessons

Category	**N**	**%**
The teacher	13	48,1
Freedom to choose partners	5	18,5
Talking to everyone	2	7,4
Listening to music	2	7,4
Mistakes are welcomed	2	7,4
Pair work-group work	1	3,7
Freedom	1	3,7
Friendly environment	1	3,7
Total	27	100

As seen in Table 5, 48,1% of the participants stated that the main factor that enabled them to feel comfortable was the teacher. 18,5% of the participants in the focus group noted that they were comfortable in the lessons because they were given an opportunity to choose their partners. Two of the participants stated that they talked to everyone in the classroom and this made them feel comfortable during the lessons. Two of the participants put forth that listening to music helped them feel comfortable in the lessons. Table 5 also demonstrates that two of the participants remarked that they were comfortable as the teacher welcomed their mistakes. One of the participants brought forward that integrating pair and group work activities into the lessons helped her feel comfortable. Another participant noted that because there was freedom in the classroom, she was comfortable in the lessons. One of the participants stated that the friendly environment was the fundamental reason for feeling comfortable in the brain-compatible lessons.

Another question in the semi-structured interview was whether or not brain-compatible learning changed their approach towards English. All of the participants stated that the brain-compatible learning intervention changed their attitude towards English. The next question in the interview aims at finding out answers to the question of how brain-compatible learning changed their attitude towards English. Table 6 demonstrates participants' thoughts about in what ways brain-compatible learning changed their attitudes towards English.

Table 6: Participants' Explanations about the changes in Their Attitudes towards English

Category	**N**	**%**
A learnable language	14	51,9
Easier to learn	7	29,6
Enjoyable to learn	5	18,5
Total	27	100

As seen in Table 6, 51,9% of the participants stated that brain-compatible learning changed their ideas about the learnability of English. They noted that they started to consider English as a learnable language thanks to the brain-compatible learning intervention they were subjected to for four months. In line with this explanation, extract 17 taken from the teacher's diary includes a comment made by one of the participants about how her thoughts regarding how difficult a language English is to learn have changed.

Extract 17: Today one of my learners came to talk about her prejudices about learning English. She said that she had not thought it would be possible to speak English without going abroad but had experienced that it was possible to do so even if she had not gone broad.

29,6% of the participants verbalized that they had thought before the brain-compatible learning intervention that English was difficult to learn, yet brain-compatible learning changed their attitude towards English in that anymore they believed English was easier to learn. 18,5% of the participants remarked that after the

brain-compatible learning intervention they started to think that English is enjoyable to learn.

Another question in the semi-structured interview was whether or not the focus group participants wanted to continue applying brain-compatible learning principles. All the participants stated that they wanted to continue learning English in accordance with brain-compatible learning principles. The question of why they wanted to continue applying brain-compatible learning principles in the future will be answered by the statistical values in Table 7.

Table 7: Why the Participants Wanted to Continue Applying Brain-Compatible Learning Principles

Category	**N**	**%**
To be the agent in learning	1	3,7
More effective	26	96,3
Total	27	100

As shown in Table 7, one of the focus group participants stated that she wanted to take control of her own learning and because she thought that she could act as the agent if she continued learning English in compliance with brain-compatible learning principles. In the study conducted by Weimer (2007), the participants perceived brain-compatible learning as a medium for augmenting engaged learning. The rest of the participants, 26 participants, remarked that because brain-compatible learning is a more effective method, they wanted to continue learning in accord with brain-compatible learning.

Participants' responses to the questions in the semi-structured interview, the descriptive statistics attained from the questionnaire, and the extracts taken from the students' diaries and the teacher's diary indicate that the participants had positive perceptions of the brain-compatible learning intervention. In parallel to the findings of this study, the results of the study carried out by Çengelci (2007) show that the participants did possess positive attitudes towards brain-compatible learning. Additionally, the research done by Duman (2010) aimed at uncovering the participants' perceptions of brain-compatible learning as well as exploring the influence of brain-compatible learning on the participants' performance in the test designed to measure the participants' acquisition of knowledge and skills in measurement and evaluation course. The findings of the study reported that the participants considered brain-compatible learning as an effective and enjoyable learning method.

5. Conclusion

This study was carried out in order to learn about young adult learners' perceptions concerning the intervention in brain-compatible learning they were subjected to for four and a half months. The findings obtained from the analysis of the data derived from the questionnaire, interview, teacher's and students' diaries indicate that the participants had positive perceptions of the brain-compatible learning intervention, and viewed

brain-compatible learning as a means of improving their proficiency in English. Participants' responses to the questions in the interview show that brain-compatible lessons may be able to set a learning environment conducive for enhancing student learning. Another conclusion to be drawn from the findings is that brain-compatible learning intervention may function as a medium of changing students' attitudes towards learning English, which is worth dwelling since Turkish students, by and large, complain about not being capable of learning English in spite of the long period of time during which they put huge effort into learning it. The participants of this study stated that contrary to the common belief they had held about English as a subject in which they could not be successful; they started to think that English was a language that could be learned after being exposed to the brain-compatible intervention. Taking into consideration the results of this study, further research could be carried out with different age groups to examine the influence of brain-compatible learning on students' proficiency in English; in addition, studies aiming to explore the effect of brain-compatible learning on students' achievement levels in other subject areas can be done. Furthermore, the results may provoke further research not only in Turkish context but also in other contexts where learners of English have difficulties improving their overall proficiency in English.

References

1. Akyürek E, Afacan Ö, 2013. Effects of brain-based learning approach on students' motivation and attitudes levels in science class. Mevlana International Journal of Education, 3(1), 104-119.
2. Ansari D, Coch D, De Smedt B, 2011. Connecting education and cognitive neuroscience. Where will the journey take us? Educational Philosophy and Theory, 43, 37-42.
3. Avcı D E, Yağbasan R, 2010. The views of students related to brain-based learning. Kastamonu Eğitim Dergisi, 18(1),1-18.
4. Barkley S, Bianco T, 2014. Learning experts examine shortfalls of on-site and online training. Supervision. 75(9), 24-36.
5. Bello D M, 2007. The effect of brain-based learning with teacher training in division and fractions in fifth grade students of a private school. PhD Thesis, Capella University.
6. Blackburn C A S, 2009. The effect of brain-based instructional techniques on the reading skills of elementary school students. PhD Thesis, Walden University.
7. Bonnema T R, 2009. Enhancing student learning with brain-based research. ERIC Digest, ED510039
8. Burkett L, 2014. Brain-based learning: A study on how teachers implement strategies in the traditional classroom. PhD Thesis, Capella University.
9. Brooks M G, Brooks J G, 1999. The courage to be constructivist. Educational Leadership, 57(3), 18-24.

10. Caine R N, Caine G, 1994. Making connections: Teaching and the human brain, New York, Innovative Learning Publications.
11. Connell D, 2009. The global aspects of brain-based learning. Educational Horizons, 28-39.
12. Duman B, 2010. Effects of brain-based learning on academic achievement: A sample case of in-class application. Eurasian Journal of Educational Research. 41, 91-115.
13. Freeman G G, Wash P D, 2013. You can lead students to the classroom, and you can make them think: Ten brain-based strategies for college teaching and learning success. Journal on Excellence in College Teaching, 24(3), 99-120.
14. Getz C M, 2003. Application of brain-based learning theory for community college developmental English students: A case study. PhD Thesis, Colorado State University.
15. Hart L A, 1983. Human brain and human learning, Arizona, Books for Educators.
16. Hodges J A, 2013. The impact of brain-based strategies: One school's perspective. PhD Thesis, Walden University.
17. Hruby G G, 2012. Three requirements for justifying an educational neuroscience. British Journal of Educational Psychology, 82, 1-23.
18. Jensen E, 1995. Brain-based learning: The new science of teaching and training. Thousand Oaks, Calif: Corwin Press.
19. Jensen E, 2000. Brain-based learning: A reality check. Educational Leadership, 57(7), 76-80.
20. Koch K R, Timmerman L, Peiffer A M, Laurienti P J, 2013. Convergence of two independent roads leads to collaboration between education and neuroscience. Psychology in the Schools, 50(6), 577-588.
21. Lucas R W, 2003. The creative training idea book. New York: American Management Association.
22. Makurjea D, 2003. Brain-based learning. In R. W. Lucas (Ed.), The creativity training idea book (pp. 2-44). New York, Amacom.
23. McNamee M M, 2011. The impact of brain-based instruction on reading achievement in a second-grade classroom. PhD Thesis, Walden University.
24. Merrill A S, 2008. The impact of constructivist teaching strategies on the acquisition of higher order cognition and learning. PhD Thesis, Colorado State University.
25. Özden M, Gültekin M, 2008. The effects of brain-based learning on academic achievement and retention of knowledge in science course. Electronic Journal of Science Education, 12(1), 1-17.
26. Peters M, 2000. Does constructivist epistemology have a place in nurse education? Journal of Nursing Education, 39(4), 166-172.
27. Phillips D C, 1995. The Good, the bad, and the ugly: The many faces of constructivism. Educational Researcher, 24, 5-12.

28. Rehman A U, 2011. Effectiveness of brain-based learning method and conventional method in the teaching of mathematics at secondary level in Pakistan PhD Thesis, International Islamic University.
29. Saleh S, 2011. The effectiveness of the brain based teaching approach in dealing with problems of form four students conceptual understanding of Newtonian physics. Asia Pacific Journal of Educators and Education, 26(1), 91-106.
30. Samuels B M, 2009. Can differences between education and neuroscience be overcome by Mind, Brain, and Education? Mind, Brain, and Education, 3(1), 45–-53.
31. Sousa D A, 1998. Is the fuss about brain research Justified? In Neural Pathway Development. Retrieved September 5, 2017, from http://www.Brains.Org.
32. Tippins D, Tobin K, Hook K, 1993. Ethical decisions at the heart of teaching: Making sense from a constructivist perspective. Journal of Moral Education, 22(3), 221-240.
33. Weimer C, 2007. Engaged learning through the use of brain-based teaching: A case study of eight middle school classrooms. PhD Thesis, Northern Illinois University.
34. Wachob D A, 2012. Public school teachers' knowledge, perception and implementation of brain-based learning practices. PhD Thesis, Indiana University of Pennsylvania.