The effect of English teaching on academic achievement based on brain based learning theory (BBL)

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ABSTRACT

Learning is a lifelong process. Personal characteristics of learners and environmental conditions will increase efficiency by using the most appropriate teaching methods and techniques according to subject 's structure. With traditional teaching methods, it is not likely to realize aims suitable for equipment required by age. For these reasons, the curriculum updated emphasizes on approaches that centers on the students. In this research, Brain Based Learning Theory (BBL) is one of the approaches with students as the focus. The aim of the research is to determine the effect of English course taught according to BBL Theory on students' academic achievement. In this research, an experimental model of the pre- and post-test control group was conducted. The research sample is made up of forty-five (45) students that study in Bohşin Secondary School in Hatay province. Methods based on BBL Theory in the experiment class and traditional teaching methods in the control group were conducted. Computer packet program was used in analyzing data's reached in the research. Statistically independent samples t-tests and Covariance (ANCOVA) analysis was conducted. As a result of the research, English lessons teaching based on the BBL Theory (Experiment Class) as against traditional teaching methods (Control Class) significantly increased academic achievement. To spread new methods and approaches, it is suggested to increase the researches to be conducted in English teaching according to BBL Theory.

Keywords: Brain based learning theory, English teaching, academic achievement, permanent learning.

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INTRODUCTION

Innovations that have emerged in the fields of science and technology together with modernization both deeply affect and transform individual and society. In this process, technological advances have become the basis of social metamorphosis. It is inevitable for people to have sufficient equipment both in producing, knowing, and transferring knowledge to life, and using technology to keep up with the present era. At this point, the importance of education cannot be denied if people absorb innovations and adapt to changes (Duman, 2008; Schreglmann and Karakuş, 2017).

Learning is a lifelong process. It seems impossible to reach the target of timely equipment with traditional teaching methods. Lessons taught with traditional teaching methods are teacher-centered, and this causes students to be unable to actively participate and attain high-level learning. Therefore, between 2004 and 2005, new methods in Turkey have started to emerge as an alternative. Traditional teaching methods have been replaced by new methods, such as constructivism, critical thinking, multiple intelligences, and brain based learning (Akınoğlu, 2005; Demir, 2016). Through these new methods, it is aimed that students discover information and form their own learning styles. Learning is an important issue that people think and question every period. Thinkers and scientists seeking an answer to the

question of how to learn effectively and sustainably from past to present have created various learning theories (Duman and Aybek, 2003; Polat, 2014). There is no doubt that different theoretical methods will start from their point of view when defining the concept of learning. Through the shift in viewpoint, we see that the meanings and terms that must be formulated vary more or less.

Today, according to the popular belief, learning is defined as a relatively permanent effect on behavior, knowledge, and thinking skills acquired through experience (Santrock, 2011). If intermediate forms are excluded, learning theories can be basically addressed in six categories: "Behavioral", "Cognitive", "Cognitive Behavioral", "Constructivist", "Affective" and "Brain Based Learning" (BBL) theories. The first three of these six categories can be subjected to a dual classification as modern theories, while the last three as postmodern theories.

In modern theories, which are sometimes referred to as traditional teaching methods, the objectivity of knowledge, the activism of the teacher, the passive receptivity of the student and the existence of a certain social distance between the teacher, and the student (authoritarianism) are the basic principles. In the postmodern model, the student's self-esteem, creative aspects, latent powers, and abilities are at the forefront, which is accepted as a unique entity. Here, the student is not a passive buyer, on the contrary, he is an active entity that reaches information by his own effort, cooperates when necessary, and is responsible for his own learning. According to this model, the teacher is not only an authority responsible for transferring information, but also a person who wants to develop the student in a versatile way, pays attention to personal differences, applies a flexible learning plan, and briefly guides the student (Aydın, 2006).

The BBL theory explains the learning process in the form of biochemical and electrochemical changes. Connections are formed between neurons in the learning process, and new learning means establishing new connections between neurons (Caine and Caine, 2002; Kaya, 2012). The eclectic features of BBL theory are similar to other new methods, such as constructivism and multiple intelligences (Demirel et al., 2002). This situation arises from the fact that BBL theory has a consensus structure that does not reject other learning theories, but sees them insufficiently.

In brain based learning process, the responsibility for learning belongs entirely to the student and learning is student-centered. In this approach, students are people who think, research, criticize, and know how and why they learn. In this context, students undertake the following activities in the brain based learning process (Cengelci, 2007):

- Students share their previous knowledge and experiences with the class and try to connect their new learning with their previous knowledge;
- Students take care to fulfill their share of duties and responsibilities in group work;
- Identifies important questions on the subject and tries to find answers;
- Students share their feelings about the topic or the classroom environment with the class;
- Students share their work with the class by doing in-depth research on their area of expertise;
- Produces his own metaphors and analogies related to the subjects;
- He reviews what he has learned and writes it in a learning diary daily;
- Students evaluate their own learning and take responsibility for learning.

According to Caine and Caine (2002), meaningful learning is essential in brain-based learning. According to this approach, even though superficial teaching based on rote is considered an integral part of education, as a result it cannot be aimed at all. The purpose of the BBL is to ensure that the information is learned in a meaningful and permanent way instead of memorizing the information (Duman, 2007). It is possible to list these factors as relaxed alertness, deep immersion, and active processing (Kaya, 2012):

Relaxed alertness: It is stated that the comfort of students in the learning environment will positively affect learning. Therefore, a comfortable learning environment should be created for students to achieve high-level learning.

Deep immersion: The process of getting students to focus on the content of learning. In the learning environment, it contributes to the completeness of the learning content and the understanding of the subject.

Active processing: It is suggested that the learning brain is an active brain. For the information to be absorbed in a meaningful way, the research of the teachers and students are supported.

BBL theory includes different methods and techniques and can be applied to almost all classes, especially in English. BBL Theory focuses on learner-oriented education, critical thinking, multiple intelligences and emotional intelligence, which are very important in terms of cognition, emotion, and behavior (Yavuz and Yağlı, 2013). According to the renewed curriculum, teaching English in Turkey has become important (Tekin-Özel, 2011). Therefore, it is inevitable to examine efficiency and effectiveness of English language teaching based on the BBL Theory. In this research, the effect of BBL Theory was investigated on academic achievement. According to Wolman (1973), the concept of success is "a progression towards achieving a desired result".

Although success is defined in such a wide range, when it comes to achievement in education, it is generally meant as "academic success", which is the expression of the skills or knowledge gained in the courses taught at school and determined by the grades and test scores appreciated by the teachers (Carter and Good, 1973).

Academic success is defined as knowledge and skills acquired outside of the learner's motor and emotional development (Ahmann et al., 1971; Erşahan, 2016). The aim of academic success in BBL is to perform high level cognitive activities such as understanding, evaluating and problem solving rather than remembering information (Demirel, 2004). The following questions were sought in the research:

1. In the English lesson, is there a statistically significant difference between the academic achievement levels of the experimental group students who were applied with methods based on BBL theory and the control group students who were applied with traditional teaching methods?

2. In the English lesson, is there a statistically significant difference between the post-experimental academic achievement levels of the students in the experimental group who were applied with methods based on the BBL theory and the control group students who were applied with traditional teaching-based methods?

METHODOLOGY

Research model

In this research, an experimental model with pre-test-post-test control group was used. In the pre-test-post-test control group model, there are two groups formed by unbiased assignment. One of them is the experimental group, while the other is the control group. In these groups, measurements were made before and after experiment (Karasar, 1998).

Participants

The school in which this research was conducted was chosen from selection of samples using appropriate sampling method. It is a suitable school for research as it has hardware such as smart boards and internet networks. Fifth, sixth, seventh and eighth grade English teaching programs were examined to determine the grade level where research will be conducted, and the seventh grade level was chosen by taking the opinions of educational experts. Experimental group of 7/A class with 23 students and control group of 7/D class with 22 students from seventh grade was chosen by random assignment method. The research group consists of 45 students in total.

Data collection tools

Data collection tool and academic achievement test improved by the researcher was used.

Academic achievement test

Academic achievement test is a test used to determine achievement at level of knowledge, understanding and application of subjects in the "Environment" unit in the English seventh grade curriculum. Academic achievement test improved specifically for units covered in the experimental research is important in determining the degree to which the unit is understood. After examining the unit gains during the development phase of the test, questions at a level suitable for Bloom's renewed taxonomy were determined, a 40-question trial form was prepared, and the pilot application of the test applied to 139 8th grade students. The test was applied to 8th grade students representing the group that learned the "Environment" unit recently (Bozkurt, 2010). After the application, item and reliability analyses were conducted to update the items that students had difficulty understanding. After the item and reliability analysis, the appropriate 24 questions were selected. The content validity of the test was not affected since the questions constituting the final 24-question test were alternative to each other. Item difficulty value of the final test is 0.42. The test is medium difficulty compared to the average difficulty value. The reliability analysis of the test was calculated with KR-20 formula using a package computer program and its value was determined as $r = 0.83$. In addition to this, Spearman-Brown formula was used for the reliability of the test. The reliability coefficient reached with this formula was determined as $r = 0.78$. The fact that the average reliability of the test is more than $r = 0.70$ shows that its reliability is high (Yılmaz, 1997).

Implementation process

The scales to be used before implementation process of the research were determined. The 24-question academic achievement test was used as a pre-test and a post-test. Before the experimental research, the test was applied to the experimental and control classes as a pre-test. In the annual plan, 4 weeks in total are determined as 16 course hours, which are deemed appropriate for the "Environment" unit. The materials of the experimental group courses (lesson plans, concept maps, posters, videos, slides, and research papers, etc) were prepared by the researcher using methods based on BBL Theory. The classroom seating plan was arranged in a U-layout. During the experimental research, the lectures of the experimental group were taught by the researcher using the course materials prepared in line with BBL methods.

Before the lessons, attention was paid to the order, ventilation and cleanliness of the classroom. During the lessons, care was taken for the learners to make physical movements and move freely. Group studies were used in a heterogeneous form to increase classroom interaction. Instrumental music was played to make the learners feel good during the activities. At the end of the lesson, the students were asked to write a diary to reflect on what they learned.

During the experimental research, the lectures of the control class were taught by the researcher in the classroom using traditional teaching methods (direct instruction, question and answer, etc). Only textbooks, whiteboards and board markers were used as course materials. When the learners had questions about the lessons, they were answered by the researcher. After the experimental process, the academic achievement test was applied to the groups as a post-test.

Analysis of data

The data of pre and post-tests applied to the research group were transferred to the computer environment. The reached data were analyzed with the help of a package computer program. The arithmetic mean, standard deviation, corrected mean and standard error values of the scores reached from the pre and post-tests of scales were calculated. Covariance (ANCOVA) analysis was also applied to determine if differences reached were significant.

RESULTS AND DISCUSSION

Results of academic achievement test pre-test scores

Arithmetic mean, standard deviation scores, and N values of the pre-test total scores of the academic achievement test applied before the experimental procedure are shown. In line with the total pre-test scores of the academic achievement test, the average of the experimental group was 27.71. The average of the control group was determined as 25.56. Whether there is a significant difference between these averages was tested with independent groups t-test analysis (Table 1). It is observed that there is no statistically significant difference between the pre-test scores of the experimental and control groups ($p > 0.05$). The preparedness levels of the groups are the same before the experimental procedure.

Table 1. Independent groups t-test results for academic achievement test pre-test total scores of students in control and experimental groups.

Groups	N	$\bar{x}$	SS	sh	SD	t	P
Control	22	25.56	7.31	1.55	43	-0.798	0.429
Experiment	23	27.71	10.41	2.56			

Results of academic achievement test post-test scores

Table 2 shows the average, standard deviation, corrected average and standard error values of total scores reached from academic achievement test pre-test and post-tests from the experimental and control groups. The post-test total score average of the experimental group ($X = 35.68$) is higher than the post-test total score average of the control group ($X = 27.27$). Covariance analysis was applied to determine if observed difference was significant (Table 3). When pre-test total scores are taken under control, it is determined that there is a significant difference in favor of the experimental group in terms of the groups' post-test corrected total scores.

Table 2. Arithmetic average, standard deviation, corrected average and standard error values of the total scores of the control and experimental groups from academic achievement test pre-test and post-tests.

Variable	Groups	Tests	Total scores			
			$\bar{X}$	SS	Corrected arithmetic average	sh
22	Control	Pre test	25.56	7.30	-	-
		Post test	27.27	10.73	27.32	2.28
23	Experiment	Pre test	-	-	--	--
		Post test	35.68	12.48	34.98	2.60

Table 3. Covariance analysis results of corrected post-test total scores of control and experimental groups.

Source of variance	Sum of squares	SD	Average of squares	F	P
Pre-test (average value) (total)	92.937	1	92.937	0.678	0.415
Group (main effect)	720.874	1	720.874	5.257	0.027
Error	5759.644	42	137.134		
Total	51509.667	45			

CONCLUSION AND RECOMMENDATIONS

Experiment class scores are higher than control class scores in regard to arithmetic mean of scores reached from academic achievement post-tests. As a result of the covariance analysis, significant difference was found in support of the experiment class in terms of post-test corrected total scores of classes when pre-test total scores were taken under control. Findings of the current research suggest that brain based learning is more effective than traditional teaching methods in terms of academic achievement. This is based on researches conducted in different years at home and abroad. Therefore, it has been deduced that English course taught with BBL Theory has been effective on academic achievement (Erland, 1999; Griffee, 2007; Baş, 2010; Demir, 2017; Erol, 2017; İnci, 2014; Şenel et al., 2016). This situation shows that the findings reached from the study are consistent with the literature.

It is likely to make some suggestions after examining this research results. Researches on teaching English courses based on BBL Theory can be raised. With more researches cnducted, new methods and approaches will become widespread in courses. During learning activities in courses, teachers can be informed by seminars that instrumental music listening, students' ease of movement and drinking water make learning positive. This will reduce threat of grade, stress and pressure, and instead a peaceful classroom environment will prevail.

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