English Teaching Innovation Classroom Based on Whole Brain Theory

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ABSTRACT

English is a key and bridge in international communication. It plays a more and more important role in the trend of economic globalization. Therefore, China attaches great importance to the innovative English teaching course of cultivating English communicative competence and improving the efficiency of English learning. With the in- depth study of brain science, the application of the research results of brain science to the educational process is the hotspot and focus of the educational circles at present. In collecting and summarizing the application of the whole brain theory in teaching, this study systematically summarizes the application of the whole brain theory in education, including the teaching principles, teaching strategies and their components based on the whole brain theory, and the characteristics of its application in English teaching. Through a questionnaire survey of teachers and students in a college English classroom, this study focuses on the application of the whole brain theory in English teaching. The results show that teachers use some teaching strategies based on whole brain theory in classroom teaching, and these strategies are positively related to students' English scores. Finally, based on the empirical results, some suggestions are put forward to improve the teaching effect and learning efficiency, and can be used for reference in English teaching innovation classroom based on the whole brain serve system.

Key Words: Whole Brain Theory, English classroom, Teaching Innovation, Efficiency

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Introduction

English, as the most common language in the world, is increasingly being used as a tool of international communication. Under the trend of economic globalization, English (Aharony, 2006) is a key and bridge in the communication between people and between countries, and plays a nonnegligible role. Therefore, how to effectively carry out English classroom teaching (Christen, 1996) and improve students' English proficiency is a question worthy of every English educator's serious consideration. At present, traditional English teaching (Kong, 2011) is still a teacher-based teaching form, students lack the initiative and exploration of learning; moreover, in the process of imparting knowledge, teachers focus on the process of understanding knowledge and ignore the situational application for language learning (Bean, 2005), which directly or indirectly affect the effect of learning. In fact, many experts and scholars have recognized the problem and tried many new teaching methods (Sebastian, 2011; Berk, 2009), but these methods lack thinking and explanation from the physiological perspective of human brain (Caine, 1990), and cannot address the low learning efficiency essentially. Therefore, the teachers should have some understanding of the principle of brain learning work, in order to have targeted classroom teaching and achieve the effect with half the effort.

It is well known that any learning activity is realized through the cognition of the brain (Baar, 2006). With the development of science

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and technology, human knowledge of the brain (Beckmann, 2010) has also shifted from the initial guessing period to the present micro-research period, and with advanced brain imaging technology (Villringer, 1997), human can understand the operational mechanism of brain and its internal nervous system (Fox, 2005). These studies can offer a new perspective for English teaching theory and practice, and provide a basis for brain-based English teaching (Domeño, 2016). Some domestic scholars try to apply the research results of cranial nerve science to English teaching, combining language learning with the rule of brain activity (Sala-Llonch, 2014), and applying multimedia technology and others methods, and the results show that this method is more efficient than the traditional teaching process and students' enthusiasm for learning has also been improved. But at present, the application teaching based on the whole brain nerve system is still a relatively new research field in China, with insufficient teaching practice (Jie, 2006) and the empirical results, and there is no systematic core idea about the application of brain science to English teaching.

Taking English teachers and students of Chinese colleges and universities as research objects, this study investigates the present situation of English classroom teaching based on the whole brain theory by means of questionnaire survey, and puts forward some suggestions and countermeasures to improve the teaching efficiency and enrich the relevant theories of English classroom teaching. It provides reference for the future English teaching innovation classroom based on the whole brain nerve system.

Application of Brain Science Theories in Education

Whole brain theory

(1) Whole brain model

With a deeper study of the brain, we have a better understanding of the structure and function of the brain. It is proposed that the left and right hemispheres of the human brain work in cooperation with a due division of labor and jointly complete the whole function of the brain. The concept of "whole brain" was proposed by Ned Hermann, who put forward the whole brain theory on the basis of the theory of division of labor between left and right brain, and divided the human brain into four types of thinking, as shown in Figure 1: Analytical and organizational thinking in the left brain and communicative and fantastic thinking in the right brain.

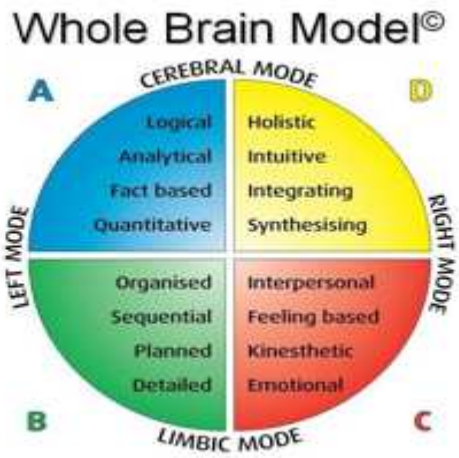

Figure 1. Whole Brain Model

Although the brain can be divided into four thinking modules, each person has a whole brain and enjoys but different memory preference in each part. The left and right brains are distributed symmetrically, not in isolation, but in close conjunction with each other through the intricate nervous system within the brain. According to people's memory preferences, each person's learning style is different. According to the distribution of left and right brain thinking modules, it is customary to divide people into those who favor left brain and those who favor right brain. Those who favor left brain is good at analyzing and organizing thinking and better at analytic courses such as mathematics and calculation, which is more suitable for traditionally organized teaching methods; while those who favor right brain is better at communicative and fantastic thinking, and vivid multimedia classroom is more attractive with better effect.

(2) Multiple intelligence theory

Some scholars think that the division of human intelligence according to intelligence quotient is one-sided, so they put forward a theory of dividing intelligence according to problem-solving ability in real life, which is called multiple intelligence theory. The multiple intelligence theory divides the human brain into eight different intelligences: logic-mathematics, music, vision, body, interpersonal communication, natural cognition, self-reflection and speech, and these intelligences correspond to the

corresponding brain regions respectively. The schematic diagram is shown in Figure 2.

As can be seen from the above figure, different intelligences are distributed in different regions of the brain, and each intelligence has its own corresponding nervous system. If a region is injured, the corresponding intelligence will be affected, but it also can be seen that the brain is a whole, and regions should cooperate with each other to complete normal human activities. Because of the influence of heredity, living environment and other factors, each human body makes the performance of these eight intelligences vary from person to person, but through a certain targeted training, these intelligences can be brought into full play. These theories provide theoretical basis for the application of brain science to pedagogy. Therefore, teachers can create diversified classes to mobilize students' initiative and activity, and improve the efficiency of learning.

Figure 2. Multiple Intelligence Theory

Emotional brain theory

Emotion has an important and profound influence on cognition and learning, but it is usually neglected. Emotion can influence the learning effect and learning efficiency by influencing the activity degree of brain and memory. It is an inherent and powerful influence factor. It's found that positive emotion can make body and mind relaxed, and in a relatively calm state, it can promote people to concentrate, and contribute to the development of cognitive processes; while negative emotions, on the other hand, are very damaging to cognition. The effects of emotions on memory also have a huge impact. Studies have shown that the hippocampus plays an important role in the formation of long-term memory. When people are in a threatening environment for a long time, they may have stress reaction, and a small amount of cortisol secretion will help learning. However, a long-term release will cause damage to the hippocampus, leading to memory problems during long-term memory and even failure of normal learning. Therefore, in the teaching process, creating a happy and positive atmosphere has a positive impact on students' learning efficiency.

Neural plasticity theory

The neuroplasticity refers to the change of physiological structure or function of the brain caused by the stimulation of external environment change or self-experience change via neuron cells and pathways. The nervous system of the brain is composed of neurons, which contain abundant dendrites and synapses, and the information inside the brain is transmitted through synaptic and neural impulse pathways. Therefore, the neuroplasticity mainly refers to the plasticity of synapses, and is divided into functional and structural plasticity.

Studies have shown that neural plasticity contributes to memory enhancement. In the process of information processing and memory, the more nerve areas are stimulated and the more networks are connected, the more secure the memory will be. Human ability is greatly influenced by environment. In complex environment, the probability of producing new synapses due to sensory stimulation is very high, so that the efficiency and speed of synaptic transmission are improved, and the neural plasticity enhances the ability to adapt to environment.

Figure 3. Types of Neuroplasticity

English Innovation Teaching Strategies Based on Whole Brain Theory

Teaching principles based on whole brain theory

The brain science is a cross-type discipline which gathers many disciplines, such as brain nerve science, thinking science, psychology, and cognition science. Brain-based teaching, also called brain-appropriate teaching, is a new theory which is put forward on the basis of the in- depth study of brain science. This theory holds that brain-based learning can increase the connections of brain internal nerves, and has stronger ability of processing and memorizing information. Through the deep thinking of the present situation of education, some scholars put forward the basic principles based on the brain learning, which reveal the function of the brain in the learning process, bring enlightenment to the reform of teaching mode, and provide a more meaningful framework for teaching and learning. These teaching principles about the brain are shown in Figure 4 below:

Figure 4. Educational Principles Based on Brain Science

Teaching strategies based on whole brain theory

There are tens of thousands of neurons in the brain, which cooperate and interact with each other to realize the important function of brain. Language function, as an important function of brain, plays an important role to human being. In order to bring the function of brain into full play in learning language, teachers should fully understand the structure and function of brain in teaching process,

and adopt appropriate teaching strategies and methods, so as to achieve the results with half the effort.

Based on the research of brain science, three strategies including whole brain teaching strategy, environment teaching strategy and emotion teaching strategy can be adopted in the process of brain-based teaching as shown in Figure 5. The process of learning needs the cooperation of the left and right brains. Although traditional teaching thinks that the language expression area is in the left brain, some studies have found that the second language learning is more dependent on the right brain development. Therefore, teachers should pay attention to and develop the development of students' multi-aspect intelligence in the actual teaching process

English teaching based on whole brain theory

In order to better carry out English teaching based on whole brain theory, firstly, teachers should understand the students, pay attention to their preference of the left and right brain, and implement more targeted teaching; secondly, students can be divided into groups according to their characteristics, so that it is convenient to assign the tasks suitable for students; finally, teachers can let students participate in the classroom teaching design process, so that students can improve their initiative and participation in learning, which is more conducive to the development of the curriculum. Figure 6 lists the preferences of left and right brains and corresponding teaching strategies. Through the targeted use of these teaching strategies, teachers can achieve a half-effort teaching effect, train students in different brain areas, strengthen the connection between the left and right brains and give full play to the potential of the brain.

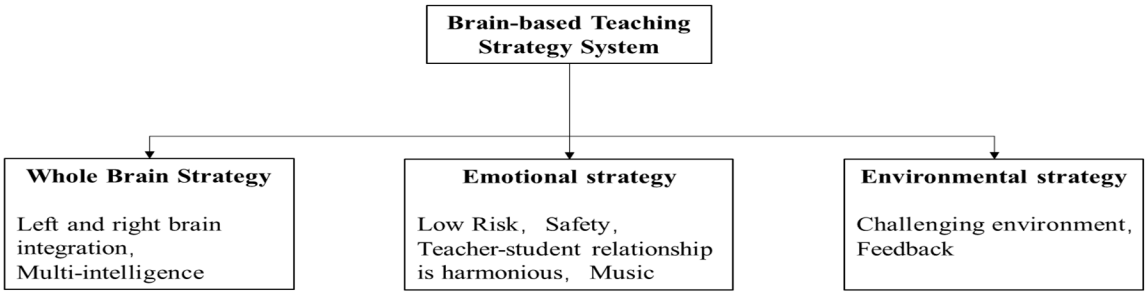

Figure 5. System of Brain-based Teaching Strategies

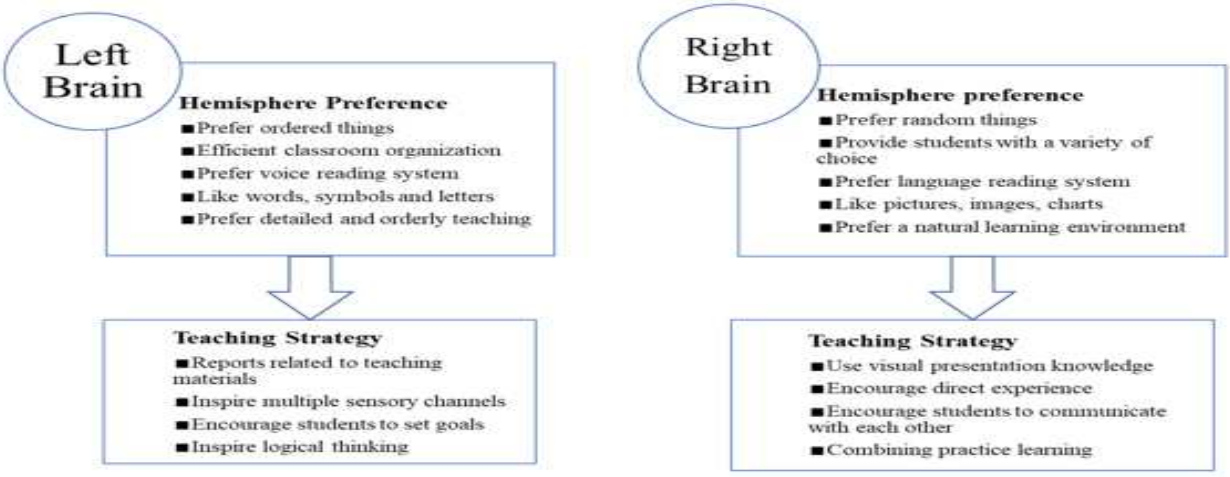

Figure 6. Left and Right Brain Preference and Teaching Strategies

Innovative classroom teaching

(1) Music and brain

Music is everywhere in our life. Music can regulate mood, and in the process of listening to music, body and mind can be relaxed, the activity of the brain will be enhanced, and attention and memory are easy to achieve the best state. Moreover, long-term music training can enhance the brain's ability to process information, and indirectly promote the ability to learn language. Some studies have found that listening to Mozart music can improve people's intelligence, and EEG scans show significant differences in brain waves between the two groups, possibly due to music stimulation that increases the connections between brain synapses and thus the overall level of the brain region. Another study found that the background music of Baroque style is helpful to remember English words. Therefore, playing some music in the course of teaching can not only create a comfortable and peaceful teaching environment for students to relax, but also strengthen and consolidate their memory of English.

(2) Physical exercise and brain

The cerebellum, which is small but contains half of the neurons in the brain, is responsible not only for the body's movement and balance, but also for speech processing, according to a new study. Learning is a comprehensive process, not just in the brain. Exercise is also essential in the learning process. In class or between classes, students can be organized to do brain exercises, a few minutes of simple stretching and breathing movements, aiming at relaxing the body so that students focus more in the follow-up learning process, and learning efficiency will be more efficient.

Research Design and Result Analysis

Research design

(1) Research object

The research object selected herein is students and English teachers of a class in M university. The students are the main body of classroom learning, and they have the absolute right to say in the teacher's teaching method and the effect; the teacher is the leading part of the classroom teaching, and the methods and ideas used in the classroom have a profound influence on the students' learning. Therefore, the objects of this study are teachers and students.

(2) Research ideas and methods

On the basis of a great deal of literature, this study designs a questionnaire according to brain-based teaching strategies. The content of the questionnaire mainly includes the use of the general teaching strategies and the use of brain-based teaching strategies in English classroom. The content of the questionnaire and the hypothesis of this study are shown in Figure 7 below. Before carrying out the questionnaire, we first pre-investigate the questionnaire. The validity test of both students and teachers' questionnaire met the statistical requirements, with good reliability index and reliable data.

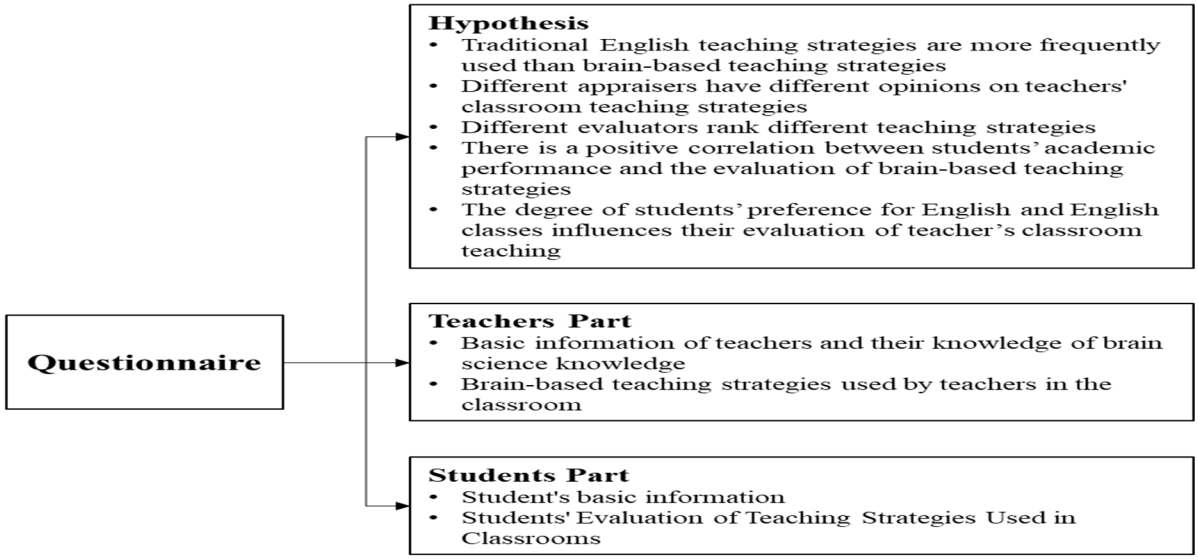

Figure 7. Types of Neuroplasticity

Questionnaire

(1) Teacher's questionnaire

In this study, a total of 28 questionnaires are distributed to English teachers who teach students from freshman to junior, and 25 valid questionnaires are collected, with an effective rate of 89%. The statistics of the teacher's basic information are shown in Table 1 below. The questions of the questionnaire also relate to the teacher's understanding of the influence of the brain on the learning rules. The results are shown in Figure 8 below.

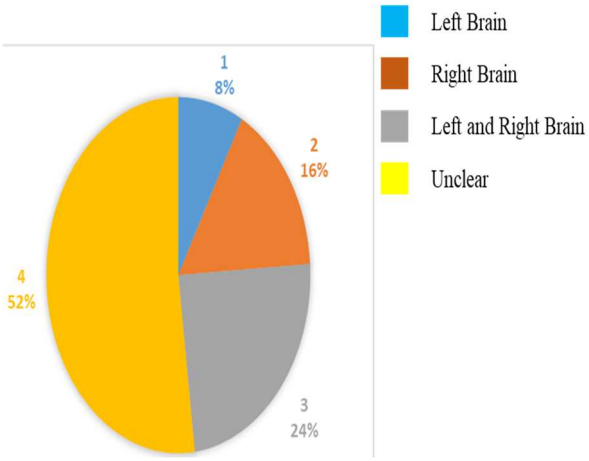

Figure 8. When Students Learn language, Which the Brain Functions

From the above figure, it can be seen that only 8% of teachers understand that the left brain plays a main role in language learning and more than 90% of other teachers have an unclear understanding or misunderstanding of the brain.

The results show that teachers have a rough understanding of brain-based teaching knowledge. However, they fail to systematically master the application of the knowledge of brain science in pedagogy.

(2) Students' questionnaire

In this study, a total of 400 questionnaires are distributed to freshmen, sophomores and juniors, and 364 questionnaires are recovered, with an effective rate of 91%. In terms of grade and gender, the distribution is uniform, and Table 2 shows the statistics of students' basic information.

(1) Teaching experience evaluation based on whole brain theory

Tables 3 and 4 are the evaluation of the use of brain-based teaching strategies by teachers and students in the teaching process. The result shows that the average of teachers' scores on their own teaching is about 4 points, which indicates that teachers have fully recognized the important role of students' emotions in the learning process. In order to improve the efficiency of learning and increase the effect of learning, teachers try their best to adopt these strategies in the teaching process to promote students' learning.

Table 1. The Descriptive Statistics of Questionnaire Reclaiming

Basic Information	Survey Object	Number of Students	Effective %	Total
Gender	Male	8	32.0	25
	Female	17	68.0	
Education	Undergraduate	4	16.0	25
	Postgraduate	19	76.0	
	PHD	2	8.0	
Teaching Age	Below 5 Years	6	24.	25
	6-10 Years	10	40.0	
	11-15 Years	8	32.0	
	Above 16 Years	1	4.0	

Table 2. The Descriptive Statistics of Questionnaire Reclaiming

Basic Information	Survey Object	Number of Students	Effective percentage	Total
Gender	Male	186	51.1	364
	Female	182	50.0	
Grade	Freshmen	85	23.4	364
	Sophomore	120	33.0	
	Junior	163	44.8	
Degree of Like English Class	Never	52	14.3	364
	Sometimes	198	54.4	
	Often	80	22.0	
	Always	34	9.3	
Have interested in English	Never	49	13.5	364
	Sometimes	200	54.9	
	Often	85	23.4	
	Never	30	8.2	

Analysis and discussion of the results

Figure 9 shows the student's perception of teaching based on the whole brain strategy. The results show that there is a positive correlation between the students' score and the teacher's rating, that's, the students who have better scores have higher perception of the teachers' teaching strategies, and vice versa. The reason is that students with relatively good academic achievement may be more interested in English language, so they are more focused, more active and better interactive with their teachers. But the enthusiasm of students with relatively low academic achievements is not high, the teachers' education to them instead easily becomes the pressure, which is more unfavorable to the teacher-student relationship and the knowledge absorption, and easily forms a vicious circle.

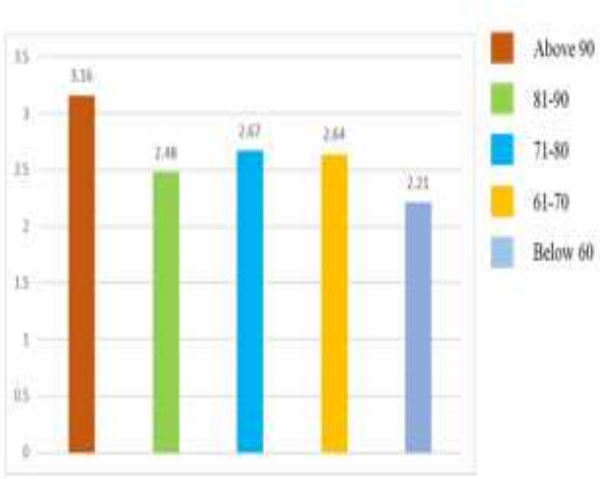

Figure 9. Descriptive Statistics of Students' Perception of Brain-based Strategies

Table 3. The Top Five Brain-based Teaching Strategies Used by Teachers

Rank	Topic	Mean	Standard deviation
1	Encourage students to actively participate in classroom activities	4.23	0.566
2	Create a positive and enjoyable teaching atmosphere	4.21	0.717
3	Classroom assessment is as important as test scores	4.07	0.825
4	Use humorous language in class to motivate students' enthusiasm	3.92	0.695
5	Use multiple interactive modes to carry out activities	3.90	0.656

Table 4. The Top Five Brain-based Teaching Strategies Perceived of Students

Rank	Topic	Mean	Standard deviation
1	The teacher will use video and painting related to learning materials in combination	3.99	0.938
2	Teachers encourage students to actively participate in classroom activities	3.90	0.957
3	Teachers create a positive and enjoyable teaching atmosphere	3.64	0.920
4	A friendly relationship between teachers and students in the classroom	3.52	1.033
5	Teachers can clearly explain the activities and explain the activities	3.47	1.008

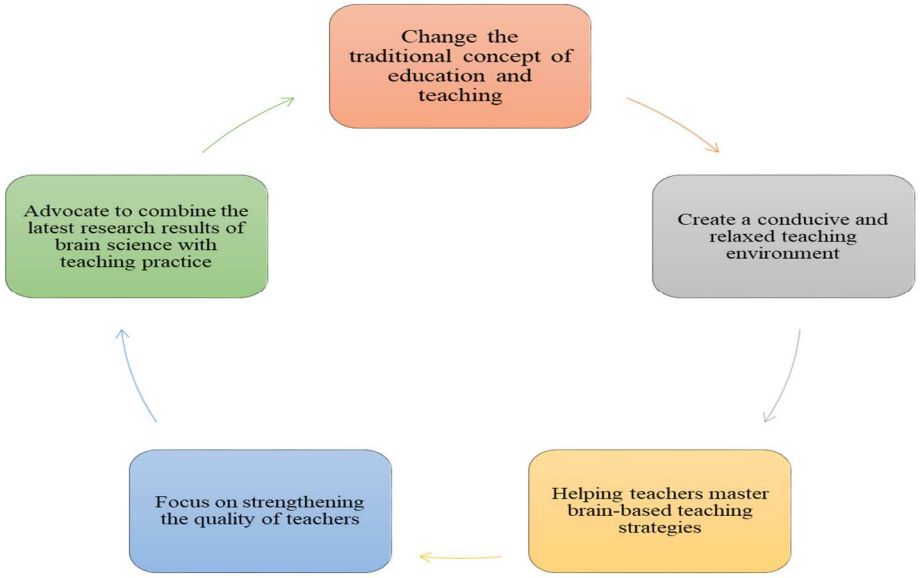

Figure 10. Suggestions of Brain-based English Class Teaching Strategy

(2) Suggestions on English innovation classroom based on whole brain theory

With the development of science and technology, the understanding of brain science will be deeper in the world. Although there are few researches on the application of brain science in teaching in China, the teaching effect is much higher than that of traditional teaching, and is more beneficial to the development of students' brain potential and the improvement of learning efficiency. In order to better promote the use of teaching strategies for innovative English teaching based on whole brain theory, this study proposes the following suggestions as shown in Figure 10.

Conclusions

In this study, teachers and students in the course of English classroom teaching in colleges and universities are taken as the objects. Based on whole brain theory, the status quo of English classroom teaching is investigated by means of questionnaire, with the following research results obtained:

(1) Theoretically, this study discusses the teaching principles, teaching strategies and their components based on whole brain theory, and the characteristics of its application in English teaching, enriching the relevant teaching theories.

(2) Empirically, this study focuses on the English classroom teaching process of a certain high school in a certain university, and makes a questionnaire survey on the students as the main body of classroom and the teachers as the leading role in the classroom. The results show that the teachers' knowledge of brain science is not systematic and comprehensive, they can use some teaching strategies based on whole brain theory in classroom teaching, and improve students' English scores by using innovative teaching strategies based on whole brain theory in classroom teaching. Finally, based on the empirical results, the study puts forward some suggestions and countermeasures to improve the teaching efficiency, and enriches the relevant theories of English classroom teaching, which can be used for reference in the future English teaching innovation classroom based on the whole brain nerve system.

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