Creative English Classroom Teaching Model Considering Brain Cognition Enhancement

Jingfang Wu[1], Yajun Xie[2*]

ABSTRACT

In order to maximize the students' brain potential in English learning, this paper makes an investigation and analysis of brain-based college English teaching classroom, and proposes an English classroom teaching mode considering brain cognition enhancement method according to the investigation. By means of comprehensive analysis of the application of brain science theory and the teaching of brain science, in combination with the model of literature investigation and questionnaire survey, this paper summarizes the theoretical basis of brain cognitive science and explains its application in college English teaching. This paper puts forward the strategies and suggestions of English classroom innovation based on brain science, so that English teaching classroom can be innovated and transformed according to the laws of brain cognition as much as possible, arouse students' brain activity, and finally realize the better learning of English knowledge. On the one hand, this study provides reference for English classroom teaching based on brain science in colleges and universities, on the other hand, it has guiding significance for the reform of English teaching in colleges and universities.

Key Words: Brain Cognition, Brain Science, College English Classroom, Questionnaire Survey, Innovative Teaching Mode

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Introduction

Human brain has always been a simulation field of human scientific exploration. With the development of technology in various industries, the research of brain cognitive neuroscience has become an important challenge of scientific research in the 21st century. The research results of brain and cognitive neuroscience have sprung up in recent years. The combination of brain cognitive science with teaching field, especially the teaching mode of combining brain cognitive method with second language learning, has received extensive attention (Ghosh *et al.,* 2010). To explore new teaching modes by means of strengthening brain cognition helps students develop whole brain learning, and improves learning efficiency and foreign language proficiency of college students (Kepinska *et al.,* 2017).

As the role of English in international communication becomes more and more important, various English teaching reforms have been carried out in domestic colleges and universities, among which the combination of computer technology and English teaching has achieved outstanding results. With the help of modern technology and network college students, multi-mode learning such as mobile learning, computer aided learning, self-evaluation can be realized (Yue, 2011).

The diverse English teaching modes have improved the effect of English learning to a certain extent. But at present, most of English teaching researches fail to summarize and explain the characteristics of human brain from

Corresponding author: Yajun Xie

Address: [1]School of Humanities, Hunan City University, Yiyang 413000, China; [2]College of Foreign Languages, Hunan University of Commerce, Changsha 410205, China

e-mail ✉ shieyajun2008@163.com

physiological height, and from the working principle of human brain memory, the comprehensive research results of brain cognition and English teaching that master the learning principle of brain are extremely rare (Van Overwalle, 2009).

Based on this background, this paper aims to improve the effectiveness of English teaching based on the methods of brain science and cognitive enhancement. According to the analysis of the basic theory of brain science, the law and characteristics of brain activity are analyzed. Combining with quantitative and qualitative methods, this paper investigates the current situation of the application of brain cognitive science in the teaching of colleges and universities, and completes the analysis of the countermeasures and suggestions. Finally, it concludes the innovative teaching mode of English classroom, which takes into account the method of strengthening brain cognition. The paper has positive effects on improving students' English learning efficiency and improving teachers' classroom teaching.

Theory of Brain Science and Its Enlightenment to Teaching

Whole brain theory

The development stage of human thinking mode is divided by American scholars into three stages, that's, left brain revolution, computer revolution and right brain revolution. Based on the cognition of brain structure, the whole brain theory thinks that human thinking can be divided into four types: analytical thinking, organizational thinking, communicative thinking and fantasy thinking (Bezrukih, 2010). The four types of thinking in the brain are left brain, left limbic system, right brain and right limbic system. The analytical thinking and the organizational thinking are controlled by the left hemisphere of the brain, while the communicative thinking and the fantasy thinking are controlled by the right hemisphere of the brain (Başar, 2006). The difference of thinking mode of human may be related to genetic genes and growth environment, and different people may tend to one thinking mode or tend to be balanced among four thinking modes. But the brain is an organic whole, and the comprehensive use of the four thinking modes constitutes the human brain's thinking system (Robinson *et al.*, 2010).

According to the enlightenment of whole brain theory to teaching, students can be divided into left brain enthusiasts and right brain enthusiasts by different thinking modes, as shown in Table 1.

Emotional brain theory

It is obvious that emotions affect people's behavior in many ways, but there is a complete set of emotional brain theories about brain and emotional reactions. Emotions canbe divided into positive and negative poles via emotional potency (A unit of efficacy of a biological reaction: positive pole is positive emotion and negative pole is negative emotion. Negative emotions are responses of neurons to stimuli such as pain and fear, and the signals of negative emotions sent by the brain. Conversely, positive emotions are responses to stimuli such as pleasure and excitement (Buck, 1985). The study of brain biology shows that the hippocampus is located in the limbic system and plays an important role in the formation of long-term memory. The

hippocampal cortex participates in the formation, learning and initial memory coding of explicit memory, and is an important part of forming long-term memory. The level of second language acquisition is largely influenced by emotional factors, which affect the retention and recall of memory information (Parr and Hopkins, 2000).

In traditional foreign language teaching, students' emotions is often neglected, and their memory is greatly influenced by the students' learning emotions. In the setting of classroom teaching, teachers should pay attention to set relaxed and pleasant environment, create a happy learning atmosphere, and guide the positive emotions of students.

Table 1. The Dividing Students' Thinking Based on Whole Brain Theory

Thinking preference	Way of thinking	Good at	Preferences
Left brain preference	Analytical thinking and organizational thinking	Good at language and abstract thinking	Like structured courses, like traditional teaching methods such as research reports, debates, study notes, etc.
Right brain preference	Communication thinking and fantasy thinking	Good use of external environment experience	Like picture, image, chart and other visual appearances

Neural plasticity theory

Informally, the neural plasticity theory is that the brain changes due to human experience and the influence of the external environment. Its formation canbe divided into three stages: morphological tissue level, cellular molecular level and neuron regeneration. Current research has shown that neural plasticity has a positive effect on enhancing the memory of human brain. Neuron cells can be stimulated by external conditions to achieve remodeling and growth under certain conditions, while neuron cells exist in the cerebral cortex layer, expanding into a memory network to store new memories (Fung and Robinson, 2013).

Neuroplasticity suggests that the duration of learning stimulates neuron cells more powerfully, promote memory of the brain, and improve foreign language learning. Some studies selected those who did not attend high schools and those with education of high schools and university education as the research objects. This further demonstrates that foreign language learning is a process that requires a long period of continuous learning.

Analysis and Investigation of English Teaching Strategies Based on Brain Cognition

Analysis of brain cognitive English teaching strategies

The clear definition of teaching strategies is to guarantee the concrete operation of achieving teaching objectives. It needs to realize teaching form and method according to different ideas in the course of implementation, which can be divided into static and dynamic processes. The formulation of teaching strategies fully reflects the important position of teachers in teaching (Horwitz *et al.,* 1995).
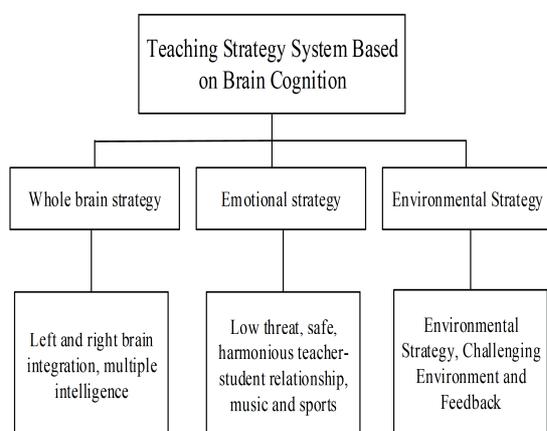

Figure 1. System of brain cognition

English teaching strategy based on brain cognition is the collection of a series of teaching activities, in which the corresponding teaching situation is created by teachers under the actual requirements of students' learning according to the research results and theories of brain science. The teaching strategy system based on brain cognition is shown in Figure 1:

(1) Whole brain teaching strategy

Based on the teaching of brain cognition, teachers need to understand the overall characteristics of students, make clear the preference of left and right brain of students, and carry out targeted teaching activities. Secondly, the learning task is assigned according to the students' left and right brain preferences. At last, according to the different teaching subjects, the corresponding multi-intelligence teaching strategies is arranged, and the classroom teaching of teaching subject is designed (Debener *et al.,* 2007).

Among them, left and right brain preference is the main embodiment of students' brain cognitive activity in teaching. According to the left brain preference, the blackboard newspaper related to teaching is arranged to stimulate various sensory channels, and use metaphors to encourage students to set goals and stimulate logical thinking. According to right brain preference, knowledge can be visually presented to encourage direct experience, help students establish connections, and encourage communication among students.

(2) Emotional teaching strategies

Brain science research shows that the human brain controls the emotional function of the person, and a series of physiological responses may affect the person's emotions, which will affect memory, and ultimately affect the effect of teaching.

In order to ensure the positive emotion of students, teachers strive to create a safe learning environment, where students cannot be affected by bad emotion in learning, building a harmonious relationship between teachers and students. It's necessary to further arouse the internal enthusiasm of students, cultivate students' learning emotion, stimulate students' interest in learning, and bring into full play their learning potential (Mcbride *et al.,* 2013).

(3) Environmental strategies

The five key elements of brain cognitive environment are challenge, new foreign, feedback,

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consistency and time. In order to improve the plasticity of neuron cells, teachers need to enrich the teaching environment under certain premise. In the process of teaching, the teacher should guide the students to feedback the teaching situation. Only can the concrete and timely feedback better control the learning of learners. At the same time, real-time teaching evaluation is helpful for students to master their English and improve the mutual understanding between teachers and students (Zhang *et al.,* 2016).

Generally speaking, the teaching strategies based on brain cognition have the characteristics of integrity, orientation and openness, and can continuously explore the students' brain learning potential through appropriate stimulation under the building environment.

Investigation and analysis of the current situation of brain cognitive english teaching

(1) Research objects and ideas
This paper selects college students and English teachers in a domestic university to investigate the use of brain teaching strategies in English. 31 questionnaires are distributed to the teachers, and 31 copies are collected, with a collection rate of 100%, and 420 questionnaires are distributed to the students, and 409 are collected, with a collection rate of 97%.

Based on the three dimensions of whole brain strategy, emotional strategy and teaching environment strategy, 5 levels of quantitative tables are used, ranging from never=1 score, rarely=2 scores, sometimes=3 scores, often=4 scores, to always=5 scores.

Set up the questionnaire items related to brain cognition, let the teachers and students participate in the questionnaire survey, and then get statistical results.

(2) Research hypothesis
a. There is a positive correlation between the students' academic achievement and the evaluation of brain based teaching strategies.
b. The degree of students' preference for English and English classes affects their evaluation of teachers' classroom teaching.

(3) Survey results of teaching behavior
A total of 31 questionnaires are distributed and 31 questionnaires are collected, focusing on the teaching strategies of brain cognitive enhancement in college English classroom and their application.

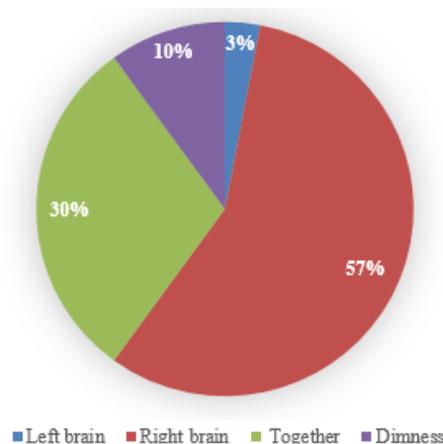Figure 2 shows the application of the left and right brain of the students.

Figure 2. Which brain function when students learning English

Table 2. Descriptive statistics of brain-based strategies

Brain-based teaching strategy	Teacher self-assessment		Student self-assessment	
	Mean	Standard deviation	Mean	Standard deviation
Whole brain strategy	3.25	0.851	2.87	1.132
Environmental Strategy	3.58	0.943	3.01	1.093
Emotional strategy	3.65	1.00	3.26	1.111

Table 3. The top five brain-based teaching strategies used by teachers

Ranking	Topic	Mean	Standard deviation
1	I will encourage students to actively participate in class activities	4.43	0.568
2	I will create a positive and enjoyable teaching atmosphere that is not threatening	4.33	0.717
3	I think class assessment scores and mid-term, final exam results as important	4.06	0.827
4	I use the humorous, funny language in the classroom to arouse students' enthusiasm	4.00	0.694
5	I use a variety of interactive modes to carry out activities in the classroom	3.96	0.668

Table 4. The top five brain-based teaching strategies used by students

Ranking	Topic	Mean	Standard deviation
1	I will encourage students to actively participate in class activities	4.43	0.568
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5	I use a variety of interactive modes to carry out activities in the classroom	3.96	0.668

Table 5. Descriptive statistics of senior student's perception of Brain Based Teaching strategies used by teachers

Options	Mean	Standard deviation
Above 90	3.16	0.983
90-81	2.48	0.859
71-80	2.67	0.931
70-61	2.64	1.054
Below 60	2.21	0.801

Table 6. Descriptive statistics of fresh student's perception of Brain Based Teaching strategies used

Options	Mean	Standard deviation
150-120	3.30	1.164
71-80	3.17	1.085
Below 70	2.65	1.266

The figure shows that the right brain of most students plays a role in the learning process, with only 3% of students using the left brain. In addition, statistics showed that 28 teachers knew the knowledge of emotion, activity and environment of brain cognitive teaching strategy, but they knew that teachers did not grasp the systematic knowledge of brain science.

(4) Teaching strategy evaluation

Table 2 shows teaching evaluations on three dimensions of brain cognitive theory. The data in the table show that the average value of emotional teaching strategy is the highest, followed by environment strategy, and the whole brain strategy successively regardless of teacher evaluation or student evaluation. Emotional strategy is still the highest self-evaluation value of teachers and students, more than the average of 4 points, indicating that emotion plays a key role in the teaching process. Environmental strategies encourage teachers to encourage students to participate in classroom activities, while students need teachers to explicitly arrange the content and steps of teaching activities to enrich the classroom.

(5) Student's perceptual evaluation of classroom teaching

Table 5 and Table 6 show that the higher the students' achievement is, the higher the evaluation of brain cognitive teaching strategy, and the longer the English learning period is, the higher the recognition degree of brain cognitive teaching. On the contrary, the worse the academic achievement is, the shorter the learning period is, and the lower the enthusiasm and self-discipline of English learning is, which results in the passive status of learning.

Research conclusions on the current situation of brain cognitive English teaching

By summarizing and analyzing the questionnaire of students and teachers, the following three conclusions are drawn: (1) At present, teachers have a certain understanding of brain learning knowledge, pay attention to the influence of emotion, activity and environment on teaching effect, and use the teaching strategies based on brain cognition to a certain extent; (2) Different learning styles lead to the preference of some teaching strategies in the use of teaching strategies. Only when teachers fully master the mechanism of brain operation can they better conduct teaching activities according to the laws of the brain; (3) The teaching strategies based on brain cognition play an active role in improving students' English achievement. The degree of students' preference to English teaching curriculum influences their evaluation of teachers' classroom teaching.

Innovative Teaching Mode

Through investigation and analysis, it's concluded that there are some common problems in college English teaching based on brain cognitive approach. In order to improve English teaching efficiency better, a new English classroom teaching model needs to be put forward.

In order to make English teaching based on brain cognitive science more popular in colleges and universities, the following five countermeasures and suggestions are put forward.

(1) Change the traditional teaching concept

The higher the recognition degree of brain cognitive method in teachers and students, the easier it is popularized. The traditional strategy of evaluating students with CET-4 and CET-6 and then indirectly evaluating teachers' teaching level should be abandoned. Based on the concept of brain science, only by fully exploring students' learning potential and creating easy and

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harmonious learning environment can students' learning interest be improved.

(2) Create a favorable and relaxing teaching environment
The favorable and relaxed teaching environment is the basic requirement of brain cognitive ability development. The relaxed learning environment can promote the coordination of whole brain, stimulate the effect of emotion theory and motivate the memory enhancement of neurons.

(3) Advocate the combination of the latest research results of brain science theory with teaching practice
The research of brain science is going deeper, and the degree of brain cognition is getting deeper. But at present, there are some limitations in the view of brain cognition, so we should grasp the dynamics of brain science research in real time and combine it with teaching practice as much as possible.

(4) Pay more attention to the training of teachers' quality
The teacher is the organizer of English classroom and the guide of students' learning. To a great extent, the quality of the teacher determines the students' learning level. The popularization of brain cognition method in English classroom needs to strengthen teachers' quality, cultivate the spirit of active learning to enhance the cognition of brain science knowledge, and encourage teachers to be brave to practice and create environment for the application of brain cognition method in classroom.

(5) Assisting teachers in mastering brain based teaching strategies
a. Strengthen the propaganda theory of brain cognitive science. b. Organize teachers to have systematic training. c. Encourage teachers to conduct academic exchanges. d. Help teachers to summarize and reflect on the teaching strategies of brain science in time.

The design principle of innovative English classroom teaching mode considering brain cognitive method should follow the relevant theory of brain science, and based on the three dimensions of whole brain strategy, emotional strategy and teaching environment strategy, focus on grasping students' learning interest and constructing relaxing English teaching environment. Under the innovative teaching mode, fully exploit students' left and right brain potential, stimulate the growth of students' memory neuron cells, and improve students' interest in learning. In this new teaching mode, teachers and students can achieve the common progress in a more harmonious and close way. As guides, teachers can develop students' more learning potential, improve the efficiency of English teaching and improve the English proficiency of college students.

Conclusions

The study on the combination of brain cognitive science and English teaching is very rare in China, and the learning process of English is closely linked to the related theories of brain science. The purpose of this study is to study the application of brain cognitive approach in college English classroom innovation. This study mainly explains the basic concept of brain science and its teaching application, and makes an investigation on the current situation of using brain science teaching in colleges and universities in China. Based on this, it puts forward some reference suggestions and strategies, and realizes the research on innovative teaching mode of English classroom considering the method of strengthening brain cognition. The main conclusions and meanings of this study are as follows:

(1) Through the investigation and analysis, it is found that there is a positive correlation between the students' English scores and the application of brain cognitive methods.

(2) Emotional theory plays the most important role in college students' English learning. The theory of whole brain and the theory of nerve plasticity also play a certain role.

(3) The study enriches the teaching contents of English teaching and brain research to a certain extent, and promotes the application of brain cognition in college English teaching.

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