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Research Article

Analysis of Effect of Learning Willingness on Medical Education Based on Cognitive Neuroscience

Ke Yu[1]
The Affiliated Hospital of Southwest Medical University

Xiaohong Li[2]
The Affiliated Hospital of Southwest Medical University

Yihua Du[3]
The Affiliated Hospital of Southwest Medical University

Abstract

This analysis is to observe and explore the effect of learning objective on medical education based on cognitive neuroscience, and to provide the basis for improving learning objective of medical education students. In this analysis, 200 medical education students in Southwest Medical University are sampled by stratified cluster sampling method. Questionnaires are used to conduct field investigation of the basic situation, learning objective and learning motivation. 100 students are in the experimental group and 100 students are in the control group. The students in the experimental group are taught with cognitive neuroscience while the students in the control group are taught in the conventional teaching model. Learning objective of students in the two groups is compared. By applying cognitive neuroscience to medical education, students have a strong learning objective. In the post-test, learning objective of students in the experimental group obviously increases from 78.3562 to 87.395 while there is no significant change (only from 77.7935 to 78.0284) in the control group. The standard deviation of the experimental group decreases from 11.2078 to 7.5392, and the minimum value increases from 57.00 to 69.00, indicating that learning objective gap of students in the experimental group has been narrowed and the polarization has got improved. The result of classification Logistic regression shows that the application of cognitive neuroscience to medical education can effectively improve students' learning objective. The learning of medical education based on cognitive neuroscience is strong, which can be guided and improved by creating a learning atmosphere, strict teaching management and professional ideological education strategies.

Keywords

Cognitive Neuroscience • Medical Education • Learning Willingness • Effect

[1] The Affiliated Hospital of Southwest Medical University, Luzhou 646000, China. Email: 524497168@qq.com
[2] The Affiliated Hospital of Southwest Medical University, Luzhou 646000, China. Email: lxh13882718283@126.com
[3] **Correspondence to:** The Affiliated Hospital of Southwest Medical University, Luzhou 646000, China. Email: 3519706090@qq.com

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In cognitive neuroscience experiments, a group of average data is required before it is compared with the data of the experimental subjects to measure whether the subjects are normal or abnormal (Wen, 2018). As in education and learning, it is necessary to further define what a rational everyman is if we judge his subjective state from the perspective of a rational everyman (Sun, Wang and Zhang, 2018). Therefore, for the result of any cognitive neuroscience experiment, the selected control group namely the so-called everyman has a critical influence on the evaluation of the subjects' experimental results (Jacobs, Iqbal, Rana Rana and Kane, 2017). Before discussing whether the subjects' experimental results are credible, the method of obtaining group data must be examined.

The selection of the experimental subjects in the control group, the data of the control group, and the analysis of general performance results of the function must be examined by rigorous statistical methods to avoid ignoring significant the control group, as well as other errors in the sampling process (Qu, Huang and Shao, 2016). Besides, the concept of general rather than normal is taken as the result of the control group so as to avoid falling into the loop argument of what normal is. After all, for both the everyman selected in the experiment and the everyman existing in the society, no behavioral representation or mental state different from that of the everyman is observed in daily life, and it is not necessary for the brain function to be completely normal (Shi, Xu, She, Ma and Zhang, 2017; Su and Tang, 2017). From the point of view of cognitive neuroscience, there are no two everymen who have exactly the same brain structure and function. As long as the performance of a specific function can fall within the so-called normal distribution of statistical methods, it can be regarded as the functional state that everyman has (Wiley *et al*., 2017; Jiayu Liu *et al.*, 2018; CAPT, 2018).

The process when learning objective acts on learning objective is the process of realizing learning objective (Fang *et al*., 2017) mainly through the operational procedures, such as willingness, means (method) and objective. The method or the necessary means of implementing learning objective becomes the way that learning objective acts on learning objective. However, the process when learning objective acts on learning objective is distinctively embodied in two aspects: whether the choice of method or the means is right, and how to use the method. This analysis will explore the specific application of cognitive neuroscience theory in learning objective on medical education.

Research Objects and Methods

Research objects

200 medical education students in Southwest Medical University are sampled by stratified cluster sampling method. Questionnaires are used to conduct field investigation of the basic situation, learning objective and learning motivation. 100 students (40 boys and 60 girls) with an average age of 18.5±1.5 years are in the experimental group and 100 students (38 boys and 62 girls) with an average age of 18.7±1.6 years are in the control group.

Research methods

The students in the experimental group apply cognitive neuroscience that needs different methods of observation and analysis according to the different research purposes and objects. For example, when molecular level study is conducted, destructive neuroanatomical methods (including fixation, sectioning, dyeing and tracing neural pathways) in biological and biological genetic engineering experiments and thalamotomy (including suction, thermal cauterization, electrical lesion and drug lesion) are used. In addition, there are microelectrodes and large electrodes that are capable of studying the activity of a single neuron, and instruments observing human cognitive activity through changes in EEG. With the development of non-invasive instruments, their accuracy and reliability are getting better. At present, the method to measure human brain activity is the most widely used experimental method in this field. The students in the control group are taught in the conventional teaching model. The willingness of students in the two groups is compared.

Observation index

The learning willingness before and after intervention of the two groups are compared and analyzed, and the learning effect of the two groups is compared and analyzed.

Statistical treatment

Statistical analysis is carried out with statistical software SPSS24.0 software package. Enumeration data: chi-square test is used to compare the enumeration data groups, and t-test and paired t-test are used to compare the differences between the measurement data groups. Two-sided test is used in all statistical tests and the difference is of statistical significance ($P < 0.05$).

Results

Descriptive statistics of learning willingness between experimental group and control group in pre-test and post-test

As can be seen from Table 1, in the pre-test, the mean value of the students' learning willingness in the experimental group is 78.3562, and the standard deviation is 11.2078 while the mean value of the control group is 77.7935 and the standard deviation is 11.0543. In the post-test, the students' learning willingness in the experimental group increases from 78.3562 to 87.395, but there is no significant change in the control group (only from 77.7935 to 78.0284). The standard deviation of the experimental group decreases from 11.2078 to 7.5392, and the minimum value increases from 57.00 to 69.00, indicating that the learning willingness gap between the students in the experimental group has been narrowed and the polarization has got improved. The standard deviation of the control group doesn't change much, and the phenomenon of polarization is still very serious.

Comparison of learning effects between experimental group and control group after intervention

In the evaluation of learning effect, among 100 students in the experimental group, 22 reach high standards (excellent), 46 meet basic requirements (good), and the remaining 32 reaches minimum standard (pass). Among 100 students in the control group, 13 meet high standards (excellent), 24 meet basic requirements (good), 56 reach minimum standards (pass), and 7 doesn't meet standards (fail). The difference between the two groups is statistically significant ($P < 0.05$).

Table 1
Descriptive Statistics of Learning Willingness Between Experimental Group and Control Group in Pre-Test and Post-Test (n = 100)

	Group	Minimum value	Maximum value	Mean value	Standard deviation
Pre-test	Experimental group	57.00	95.00	78.3562	11.2078
	Control group	56.00	93.00	77.7935	11.0543
Post-test	Experimental group	69.00	99.00	87.395	7.5392
	Control group	58.00	94.00	78.0284	10.8256

Note. Compared with control group, $P < 0.05$; Compared with pre-test, $P < 0.05$.

Table 2
Comparison of Learning Effects between Experimental Group and Control Group After Intervention [n (%)]

Group	n	Excellent	Good	Pass	Fail	Excellent and good rate
Experimental group	100	22(22.0)	46(46.0)	32(32.0)	0(0.0)	68(68.0)
Control group	100	13(13.0)	24(24.0)	56(55.0)	7(8.0)	37(37.0)
$\chi 2$						10.286
P value						<0.05

Discussion

Cognitive neuroscience is a biological science to understand the cognitive and psychological processes in the academic field based on the brain nerves. In other words, it is to answer questions about how psychological or cognitive function works in the brain. Cognitive neuroscience is a new field that combines cognitive science with neuroscience, covering physiological psychology, cognitive psychology and neuropsychology.

The scope of research of cognitive neuroscience can be distinguished by several ways: (1) by different stages of the mental process, including how information is obtained—sensation, how to give explanation to give meaning—perception & recognition, how to store and modify—learning & memory, how to ruminate the information—thinking & consciousness, how to predict the future environmental state and the result of action—decision making, how to guide behavior—motor control and how to communicate—language (Yang, 2017). (2) By research topics, including the development of brain structure and function, the plasticity of brain, the operation of brain sensory system and motor system, attention, memory, language, advanced cognitive function, the evolution and causes of brain, and emerging emotional and conscious topics. (3) By research method that can be divided into two types. The first is clinical cognitive neuroscience, including the research of brain injury, tumor, vascular disease, degenerative or infectious disease and epilepsy. The other is experimental cognitive

neuroscience, which focuses on animal experiments in the past. However, due to the development of non-invasive imaging technology, the researches of human body experiments are becoming more and more common recently so that we can directly observe brain activity images of some cognitive functions.

The best way to solve the problem of learning willingness on medical education is to apply willingness to the objective. The more specific the method is, the easier it is to implement and the better the realization of the objective will be. Therefore, this study suggests that by applying the cognitive neuroscience theory to the students in the experimental group, the way to maintain that the willingness acts on the objective is the means or method. The more specific the means is, the easier it is to operate. The application degree will directly promote the realization degree of the learning objective.

Through the implementation of cognitive neuroscience training and intervention, it is found that: in the post-test, the students' learning willingness in the experimental group obviously increases from 78.3562 to 87.395, but there is no significant change in the control group (only from 77.7935 to 78.0284). The standard deviation of the experimental group decreases from 11.2078 to 7.5392, and the minimum value increases from 57.00 to 69.00, indicating that the learning willingness gap between the students in the experimental group has been narrowed and the polarization has got improved. In the evaluation of learning effect, among 100 students in the experimental group, 22 reach high standards (excellent), 46 meet basic requirements (good), and the remaining 32 reach minimum standard (pass). Among 100 students in the control group, 13 meet high standards (excellent), 24 meet basic requirements (good), 56 reach minimum standards (pass), and 7 doesn't meet standards (fail).

Conclusions and Suggestions

Research conclusion

The learning of medical education based on cognitive neuroscience is strong, which can be guided and improved by creating a learning atmosphere, strict teaching management and professional ideological education strategies.

Countermeasures and suggestions

Carrying out learning activities in the brain-based learning model

Carrying out learning activities in the brain-based learning model can ensure that classroom teaching is conducted within the learning framework suitable for the brain, and the effective and successful learning can bring positive emotional connection to learners. When learning is carried out according to the learning module and its order in the "brain-based learning model", the challenging and novel learning activities will bring positive emotional stimulation to the learning of medical education students. Moreover, in the brain-based learning model, each specific learning activity is taught according to the steps of medical education students'

sharing—mutual evaluation—teacher's summary. This timely feedback system satisfies learners' learning needs, providing positive emotional connection for the brain (Hou *et al*., 2018).

Making medical education students' study with emotion

The course and the content of medical education are full of emotion. Making students feel the emotion and sublimate it can provide positive emotional connection for the brain. The specific teaching strategy is to let the students have enough time and space to interpret the course teaching content of medical education and have enough time to express their feelings. Positive emotion strategy is the basic strategy of brain-based medical education teaching, which represents a kind of idea to lead teachers to change their behavior. It permeates all kinds of different specific teaching strategies in all teaching links (Wang, Shi and Li, 2017).

Constructing a feedback system of diversified learning contents

In the course teaching of medical education, learning contents are all based on the relevant theories of cognitive neuroscience so that every learning activity is carried out on an open platform, thus constructing a feedback system of diversified learning contents (Wang, 2018). Rational, profound and convincing judgment on the value of the nature of things needs to synthesize the internal and external data and information, and to make an inference in accordance with the objective fact.

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