

Evaluation of the Application of Voluntary Cooperation Inquiry Method in Stimulating Interest in Resident Training Classes

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Abstract: *Objective: To explore the application and effect of small group-based voluntary cooperation inquiry method in resident training teaching. Methods: A total of 50 physicians receiving resident training in the First Affiliated Hospital of Nanjing Medical University from September 2016 to July 2021 were randomly divided into two groups for research. Trainees in the test group (group A, n = 25) adopted voluntary cooperation inquiry method; and those in the control group (group B, n = 25) applied the teaching method. The teaching effect was evaluated through questionnaires, theoretical knowledge tests and practical skills assessment. Results: (1) The results of the questionnaire showed that the residents in the test group were significantly better than those in the control group in terms of active preview ($p < 0.001$), whole-process concentrating on participating in the questionnaire ($p < 0.001$), searching for points of interest ($p < 0.001$), proposing high-quality questions ($p < 0.001$), and different teaching methods ($p < 0.001$). (2) The theoretical knowledge test results revealed that the results of physicians receiving resident training in the test group were significantly better than those in the control group ($p < 0.001$). (3) The results of practical skill assessment indicated that the scores of physicians receiving resident training in the test group were obviously superior to those in the control group ($p < 0.001$). Conclusion: There is positive application effect of voluntary cooperation inquiry method in resident training teaching, and it greatly improves trainees' learning interest and learning ability.*

Keywords: *Voluntary cooperation inquiry method; Teaching method; Resident training*

1. Introduction

The results of interest-based learning are qualitatively different from those of only effort-based learning, as proposed by John Dewey, a world-wide known educator, in his book "Interest and Effort in Education". Dewey believed that "Spontaneous impulsivity is the foundation of interest. Why interest generates, why people are interested in one thing rather than the other, and why there is no state of complete lack or impartial distribution of interest, all of these are the choices made by constant spontaneous impulsivity, not the results of the environment stimulating individuals." [1].

The physicians resident training are the master of learning. Their internal attitude towards learning (e.g., learning with interest or rejecting passively) is a determinant of the effect of learning generally, which will directly affect the quality of teaching. Trainees being indifferent to learning is a Gordian knot in teaching. In the case of a failure to adopt effective measures to stop and correct the teaching design and implementation, the situation will continue to deteriorate and extend to other trainees, leading to an awful mess to deal with the final situation of teaching effect. Importantly, in order to address the problems existing in teaching of medical education in classroom, it is necessary to establish new "concept of talent", "concept of teacher" and "concept of student" [2].

For teaching in classroom, both voluntary cooperation inquiry method [3] and the teaching method emphasize on realizing effective learning of the trainees receiving resident training through different forms. Both methods aim to ensure that the trainees receiving resident training can take a positive, high and excited mood to study, think actively, participate seriously and actively in various training programs, and be glad to acquire new knowledge and to improve in learning.

2. Subjects and Methods

2.1. Subjects of study

The subjects of study were a total of 50 physicians receiving resident training in the First Affiliated Hospital of Nanjing Medical University from September 2016 to July 2021. The enrolled subjects were randomly divided into two groups for research. Trainees in the test group (group A, n=25) adopted voluntary cooperation inquiry method; and those in the control group (group B, n=25) applied the teaching method. There was no significant difference in the duration of study between the two groups, which was 1.8 years in group A and 1.7 years in group B ($p=0.413$). In addition, no significant difference was found in the academic performance of basic courses in the past.

2.2. Implementation of education program

By adopting voluntary cooperation inquiry method, the physicians receiving resident training were required to be the master of the classroom and play the subjective role to acquire knowledge under the guidance of the tutor. Through various exploration activities such as independent discovery, experiment, operation, investigation, collection and processing of information, expression and communication, the physicians receiving resident training could acquire knowledge, cultivate ability, and develop the spirit of exploration and the ability to innovate. The main procedures and implementation were described as follows:

Firstly, guided discovery, with attention paid to the attempt of independent inquiry, inspirational appeals and detecting interests.

Learning motivation is intrinsic that can encourage and guide the physicians receiving resident training to learn directly. While the interest of learning can be considered an important psychological component of learning motivation, which can stimulate the strong desire of the physicians receiving resident training to seek for knowledge. Forced learning without any interest has a negative impact that may ultimately destroy the trainees' intention to learn. As proposed by Covington, an American psychologist, self-acceptance was the highest demand of human beings. Only if an individual felt that he/she had value can he/she accept himself/herself; significantly, self-worth was the intrinsic motivation for individuals to pursue success. Meanwhile, Confucius said: "Those who know to learn are not as good as those who love learning, and those who love learning are not as good as those who are happy with learning." Obviously, only interest can stimulate students' intention of pursuing knowledge.

Secondly, small group-based cooperation learning and question-answer teaching to broaden the horizon of the trainees and teach students in accordance with the actual situation.

Different teaching methods could be developed according to the education level and age of the trainees, and trainees could be guided to ponder and experience from different perspectives and aspects without deviating from the basic ideas through this approach. Meanwhile, teaching methods could be changed accordingly with different emphasis in view of different teaching contents and different situations of physicians receiving resident training. Eventually, the purpose of flexible teaching was to achieve teaching objectives more effectively. In the whole teaching activity, trainees were the main body of the activity, the final practitioner and beneficiary of the activity, and the tutors always played the role of guiding [4].

Thirdly, effective teaching effect in the classroom to promote practice, express actively, stimulate interest with new knowledge, and reasonably control the difficulty during teaching.

To achieve effective teaching, it was practicable to understand trainees' psychological activities, strengthen targeted teaching, and grasp the curious characteristics of the physicians receiving resident training. Too simple knowledge and mechanical way of teaching can weaken trainees' interest. Therefore, it was important to carry out multi-level education for the trainees through reasonable control of the difficulty of knowledge, and level-by-level training for difficulties to promote the trainees to enjoy overcoming difficulties. In addition, discussion-based teaching was characterized by participation, openness, inspiration and criticism [5].

Fourthly, summary through teaching with affection and inspiring emotion

The educational goal of the method was to enter the emotional world of the physicians receiving resident training, and touch the resonance within, helping the physicians to acquire knowledge, complement the insufficiency of each other, and encourage summarizing and improving based on full

grasping of teaching materials and cultivation of learning interest. Teaching in classroom could play the most important role in acquiring knowledge for the physicians receiving resident training, and advocate the initiative and improve the exploration ability of trainees to learn [6].

At the same time, the teaching method presented an approach of training based on students' interests and preview, which was characterized by popularity and directness through teaching implemented by the tutors. Giving full leading role to tutors themselves, this method was conducive to helping trainees master the teaching materials comprehensively, deeply and accurately. The main procedures and implementation were described as follows:

Firstly, review of prior knowledge: Relevant skills or concepts shall be reviewed as necessary to promote the trainees' understanding of the first task of current course. The tutor was responsible to establish a connection between the reviewed content and the information to be presented. In this way, the physicians receiving resident training would be familiar with the new medical knowledge to be learned, and it was convenient for the trainees to incorporate the new knowledge into the original cognitive structure.

Secondly, setting of learning objectives: At the beginning of teaching, the physicians receiving resident training should be informed of the learning content and objectives, embellished with intimate relationship, so as to stimulate the trainees' learning motivation. Meanwhile, at the beginning of teaching in classroom, the physicians receiving resident training should be instructed to establish a meaningful learning orientation, set corresponding goals in advance, and propose certain requirements for mastering knowledge, skills, and emotional goals.

Thirdly, new knowledge teaching: The tutor should guide the physicians receiving resident training to form certain concepts to grasp the intrinsic essence and rules through thinking processing on the basis of perceptual knowledge. In this way, the perceptual knowledge could be accepted as rational knowledge, so as to realize the self-construction of new medical knowledge of the trainees. The teaching can be implemented via direct, concise and well-organized expression to present problems, and to address problems based on the strategy of concept introduction, exemplifying and conceptual understanding.

Fourthly, reinforcement and feedback: The tutor can conduct a simple formative test by using written, hands-on or oral methods. It can help tutors to check the understanding of trainees, consolidate new knowledge, learn about the number of trainees qualified or failed to grasp the teaching objectives, and identify problems that had been addressed or not, so as to adjust the speed of teaching.

Fifthly, summary and application: The tutor can outline and summarize the main contents of the whole lesson to give the physicians receiving resident training a systematic and complete presentation of the knowledge. In this way, it help the trainees deepen their understanding and memory of the acquired knowledge, and develop their comprehensive generalization ability. Simultaneously, it can integrate the newly learned content with the prior knowledge of the trainees to display the learning progress of the trainees.

2.3. Teaching effect evaluation

The evaluation of teaching effect consisted of self-evaluation and ability assessment. The self-evaluation included three aspects: internal drive, personalized teaching and effective teaching in classroom. An anonymous survey was conducted on the physicians receiving resident training. Furthermore, the ability assessment were composed of the test of theoretical knowledge and clinical operational skills of the two groups of trainees. The teaching effect was evaluated eventually subjectively and objectively. Theoretical knowledge test of the teaching content adopted close-book exam, with full marks of 100 points. Meanwhile, in the assessment of clinical operational skills, the senior deputy chief physician was invited to supervise the operational practice, with a score of 25 points for each item of standardization, fluency, emergency response, etc. Questions were proposed randomly for each trainee during the operation, with 25 points for each item (100 points in total).

2.4. Statistical analysis

SPSS 20.0 software was used for data analysis of this study. The subjective data of evaluation was expressed by the rate and compared using χ^2 test; while the objective test scores was presented in the form of ($\bar{x} \pm s$) and compared using t test. $P < 0.05$ indicated that the difference was statistically significant.

3. Results

1) The results are shown in Table 1.

Table 1: Questionnaire results of the two groups of the physicians receiving resident training

Items	Group A (n=25) N(%)	Group B (n=25) N(%)	P
Internal drive			
Active preview	17(68.0)	6(24.0)	<0.001
Whole-process concentrating on participating in the questionnaire	10(40.0)	2(8.0)	0.001
Searching for points of interest	19(76.0)	12(48.0)	<0.001
Individualized education			
Able to propose different ideas	20(80.0)	6(24.0)	<0.001
Different teaching methods	21(84.0)	10(40.0)	<0.001
Effective teaching in classroom			
Whether to acquire new knowledge after learning	18(72.0)	13(52.0)	0.119
Reasonable control of difficulty	11(44.0)	9(36.0)	0.19

2) Assessment of theoretical knowledge and operating skills

The results of theoretical knowledge test and operational skill assessment of group A were higher than those of group B. To be specific, the average score of group A was 85.6, significantly higher than that of group B (71.2) ($p < 0.001$); and the average score of operational skill in the former group was significantly higher than that in the latter group (78.5 vs. 70.1; $p < 0.001$). As shown in Table 2.

Table 2: Assessment results of theoretical knowledge and operating skills of the two groups of the physicians receiving resident training

	Group A (n=25) (points, $\bar{x}\pm s$)	Group B (n=25) (points, $\bar{x}\pm s$)	P
Theoretical knowledge	85.6 \pm 3.6	71.2 \pm 5.0	<0.001
Operational skill	78.5 \pm 3.1	70.1 \pm 13.5	<0.001

4. Discussion

Charles Darwin, a biologist, wrote in his autobiography: "When I tried my best to recall my personality in middle school, I found that at that time I already had the unique qualities of placing hopes on some beautiful things in the future. In other words, I had extremely strong and diverse interests; I was eager to understand what I was interested in; and I was very happy when I found out any complex problems or things." Enthusiasm is the best teacher for things you want to learn. Driven by strong emotions, the human beings will naturally march forward courageously and focus on what they are interested in. It will naturally achieve the desired effect as far as the learning effect is concerned.

The teaching content for the physicians receiving resident training should take the teaching objectives as the criterion, and a strong sense of responsibility as the strong internal drive. Critically, knowledge, skills and emotional goals are all indispensable in three-dimensional goals. Concerning the emotional goals, the blending of emotion and reason are indispensable throughout the teaching process. In the teaching process, it is of necessity to enlighten the trainees with reason about the learning objectives and tasks, and to move them with affection about the learning initiative and enthusiasm. Importantly, emotion and reason go hand in hand, which could be followed in the teaching process.

It's impossible to preach in vain. It is important to stimulate the enthusiasm of the trainees in the teaching process, stimulate the trainees' psychology, and attract their attentions. Specifically, it is critical to inform the trainees to understand importance of the teaching content before class. While during teaching, the tutor can create an atmosphere of learning, playing videos or other auxiliary teaching methods, so that the trainees can swim in the ocean of knowledge, and enjoy the process of learning from beginning to end.

In the aspect of the teaching content, it is recommended to design the teaching strategy specifically according to the specific characteristics. Meanwhile, as far as the key and difficult points of teaching are concerned, the teaching design of specific knowledge shall be carried out by adopting multiple teaching methods such as lead-in method, situational teaching method, etc.

Stimulating interest in teaching are generally characterized by the following aspects: 1 intrinsic drive as the fundamental driving force to stimulate the emotions and detect interests of the trainees; 2 individualized teaching in classroom as a support to broaden the mind of the trainees and teach students in accordance with the actual situation; and 3 effective teaching effect in the classroom to stimulate interest with new knowledge, and reasonably control the degree of difficulty during teaching. The results in group A showed that voluntary cooperation inquiry method played a significant role in teaching specific theoretical knowledge and following traditional teaching in classroom. Furthermore, the application of teaching method is to stimulate the trainees' desire for self-study. The present study was guided by real-world medical cases and surgical materials. New questions were proposed step by step constantly through four times of questioning, and the physicians receiving resident training participated in the whole process of questioning and answering. Questions concentrating on improving the interest of the trainees were proposed that consequently increased the interest in learning during the process of problem addressing. The enthusiasm in preview and discussion of the physicians receiving resident training in group A was higher than that in group B. These findings suggest that voluntary cooperation inquiry method will be of great benefit to further development in the future since traditional spoon-fed education prefers traditional teaching and questioning, which lacks reasonable arrangement for interest-inducing teaching methods, but just focuses on traditional theoretical knowledge.

In addition to improving the teaching effect, the implementation of teaching in group A answered the questions of inexperienced physicians receiving resident training, enabling the zero-base trainees to enter the learning state as soon as possible, which contribute to a significant improvement in speeding up the teaching progress. The heuristic education can enable the physicians receiving resident training to actively participate in the learning with great stimulation of their enthusiasm. The detection of interest is fundamental for the trainees to learn, so as to truly play the principal function. Carl Ransom Rogers, a American psychologist, said: "The construction of a harmonious and close relationship between teachers and students is quite important for students to have a sense of security in learning in classroom, dare to truly express themselves, fully express their personality and creatively develop their potential." Through the method proposed in our study, the physicians receiving resident training can fully exercise their rights in independent exploration, and fully enjoy the fun of exploration. Simultaneously, the tutor should timely grasp the feedback of the trainees when giving lectures [7].

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