CSCanada
Higher Education of Social Science
Vol. 9, No. 4, 2015, pp. 36-41
DOI:10.3968/7684

ISSN 1927-0232 [Print]
ISSN 1927-0240 [Online]
www.cscanada.net
www.cscanada.org

Advanced Feedback Experiment Methods With Hiher Education Theory

YOU Yangming[a],*; WANG Bingzhang[b]; YOU Shucai[c]; ZHANG Chunhua[a]

[a]Institute of Physics and Information Engineering, Cangzhou Normal University, Cangzhou, China.
[b]Mechanical and Electrical Engineering College, Cangzhou Normal University, Cangzhou, China.
[c]Cangzhou Normal University Journal Editorial Office, Cangzhou Normal University, Cangzhou, China.
*Corresponding author.

Received 19 July 2015; accepted 25 September 2015
Published online 26 October 2015

Abstract

Advanced reserved experiment method focused cognitive law, constructivism and assimilation theory in a way that science teaching method has a profound theoretical foundation and many years of teaching practice. It is a product of deepening the reform of higher education, it is a method of quality education, innovative ability indispensable.

The advanced feedback experimental method, that is, to arrange the experimental activity ahead of teaching the theory, so that students can find problems in the course of experiment and solve them in the follow-up theory teaching, it is able to fully mobilize the enthusiasm of students and let them be full of "suspense" before the class. The biggest advantage of the advanced feedback experimental method is to provide more supports to the heuristic and interactive teaching. It enables students to get the maximum amount of information of physics, chemistry, biology and other natural phenomena within limited time and space and in turn to co-operate the classroom teaching strongly. The "hide" of experimental class and the "show" of theory teaching echo each other to make the experiment and theory class linked organically. That can stir up students' interests and passion in learning. So that they have "Suspense" before class, after-class sense of accomplishment. After more than ten years of practice, it proves that the advanced feedback experimental method is indeed a good way to reform the professional of natural science for higher education sectionand. It is worthy for recommendation.

Key words: Advanced feedback experimental method; Cognitive rules; Constructivist; Assimilation theory; Science and technology

You, Y. M., Wang, B. Z., You, S. C., & Zhang, C. H. (2015). Advanced Feedback Experiment Methods With Hiher Education Theory. *Higher Education of Social Science*, *9*(4), 36-41. Available from: URL: http://www.cscanada.net/index.php/hess/article/view/7684
DOI: http://dx.doi.org/10.3968/7684

INTRODUCTION

In 21st century, great changes will take place in China's higher education. The main sign is: From the past to impart knowledge to give priority to education to cultivate students' innovative ability and comprehensive quality education, really set up take the student as the main body, teacher as the leading idea of education. Cognitive law is the guiding ideology of higher education, constructivism is the macro guiding principle of higher education, assimilation theory is the concrete practice of higher education of micro code of conduct. The combination of the three pillars of theory constitutes the current our country the main content of the basic theory of higher education. As the latest teaching theories in education psychology have mature, mainly reflects in the knowledge view, learning view, students view, the role of teachers and students and its role, learning environment, and six aspects such as teaching principles.

Over the years, the three pillars of the theory has been advanced feedback experimental method research and exploration, efforts to change the talent training mode and training; efforts to explore the relationship between theory and experiment, the relationship between class and after class, the relationship between teachers and students. Advanced feedback experiment method is the product of higher education to deepen reform, Is the fruitful results of

innovation practice. Completely in line with the national medium and long-term education reform and development plan outline (2010-2010) on the "support the student to participate in scientific research, strengthen the practice teaching link" the instruction spirit. The concept of it enriched and developed the theory of higher education, the practice of it will promote the deepening of teaching reform in colleges and universities and to expand. Its application will certainly for higher professional education of natural science in China make an important contribution to improving the teaching quality.

1. THE CONNOTATION OF FORWARD FEEDBACK EXPERIMENT METHOD

The advanced feedback experimental method or Simple is called Preceding Experimental Methods is to make experiment teaching, with the specific aim and plan ahead of theory teaching. After every experiment, we put forward the theoretical knowledge to be taught in the next theory teaching class, thus it enables the students to know the aim of experiment and the knowledge needed to accomplish an experiment and master related experimental techniques. Under the guide of the teacher, students are required to observe the experiment phenomena and record teacher's questions so that they can think about them, for they are the main points for the next lesson. Preceding Experimental Methods mean the emphasis on "advance", aims "give back"; Blending "post-theory" in the "ahead of experiment" (Walker, Allen, Bradley, Ramirez, & Soo, 2012). To do so, if we can make students to acquire plenty of information in physics, chemistry and biology and enable it to assist classroom teaching, if we can link "concealment" in experiment with "revelation" in theory and combine them, we can stir up students' interests and passion in learning.

The biggest advantage of Preceding Experimental Methods is that it gives much support for elicitation teaching. Elicitation teaching requires students' senses. If students have no observation or sense of natural phenomenon as basis, how can we enlighten them and interact with them? With the development of study, some important phenomena can not be observed in everyday life. Perceptual knowledge becomes rare. Information related to theory can only be acquired through experiments directly or indirectly. However, with the restriction of many conditions, such as environment, devices, time and technology, experiments that can be observed or sensed become rare. So some people stress to use multimedia technology and 3D virtual simulation technology to solve the problem. But I think, if we employ multimedia technology a lot to acquire related information, it will have to take up too much time in class. At the same time it will reduce the time in which the students sense the experiment. It is not a correct thing for students of science if we should not pay much attention to one thing and neglect another. Though we hold positive attitude to multimedia technology and 3D virtual simulation technology, we must consider its negative effect on us. To cooperate our classroom teaching, designing some experiment with an aim become more and more important (except super superconductor experiment and high energy particle collision experiment).

2. ADVANCE FEEDBACK EXPERIMENT METHOD AND THE MODERN EDUCATION THEORY

Advance feedback experiment method set cognitive law, constructivism and assimilation theory in one, it has a profound theoretical foundation and science teaching methods teaching practice for many years. It is a product of deepening the reform of higher education, is fruitful innovation practice.

2.1 Advance Feedback Experiment Methods Theory Is Based Cognitive

Ever since humans began cognitive knowledge, process knowledge is produced by the existence→ Images → concept → knowledge. Knowledge of the most basic elements is the concept, and the concept stems from objective reality, the process generated by the existence of the concept is the recognition of the principle of humanity. The concept of presence is a source of generation, and the thinking is the concept of the basic conditions for the survival of humanity. Concepts survival needs two factors: First, the human brain thinking, the second is an objective. Dialectical relationship between knowledge, concepts, existence between how to grasp and handle in professional teaching, advance reserved experiment gives the best answer. Unlike college high school stage, the esoteric theory, logical and strong; Students at this stage has certain analytical ability and critical spirit, a number of critical, important concepts rely on inference, deduction, they will not accept. They have to see some real stuff related to this before they agree to accept. Cognitive processes of "existence" link is not indispensable. Abstract boring can be in-depth study of general relativity, not because later observed so few pitiful "phenomenon" it? What these phenomena and the corresponding set of data? They are the existence of the cognitive processes!

However, college, graduate of the need to observe the phenomenon has been far different from the primary and secondary schools so simple and easy. To under normal circumstances and conditions observe them is difficult, if not impossible. Advanced design of the experiment is to provide classroom instruction needed those existence, Allow students to perceive, feel, the lack of existence link fill.

To accept the new concept does not necessarily need to have this direct link existence. However, some

important, basic concepts of learning must have "presence" of the link. Be sure to experiment with the appropriate (including classroom demonstration experiment). This is exactly why the state has invested heavily in the construction of university laboratory each year for the significance lies. The missing link, students will feel dull and boring existence, even suspicion and confusion. Advance experimental teaching method so purposeful, planned ahead of the theory of teaching, Before teaching new knowledge, under the experimental guidance of teachers, It requires students to carefully observe the experimental phenomena of teachers assigned to record the problem posed by the teacher. This part of the design, Is the cognitive rules "existence → Images → concept → knowledge" of the specific practice (Walerk, Allner, 2007).

2.2 Advanced Feedback Experimental Constructivist Teaching Principles Insist on the Macroscopic Process

Advance feedback experiment method Study and exploration in the natural sciences in the field of higher education, only it is possible to be successful, The main reason is that the dominant ideology ahead of the experimental method and the principles of constructivist teaching has a strong consistency (Bradley, Ramirez, & Soo , 2008).

2.2.1 In the Student Center, Organization and Implementation of the Teaching Process

Advance feedback experiment method particularly emphasizes the acquisition process, the means and methods of knowledge, that this is the only way to achieve meaning construction. Before every important concept to learn as much as possible to allow students to observe the corresponding natural phenomena, perception change process, providing support for the inspiration and interactive teaching. To do this you need to advance one after another experimental design implemented in the teaching process, in order to achieve this goal, we must attach great importance to the organization of the teaching process, implementation and regulation. After leading the experiment to guide students to collect and analyze relevant information and information on the issues raised in the experiment and seek to verify various assumptions. In the learning process, students engage in self-monitoring, self-test, self-examination and other activities, teachers should determine or detect whether valid or whether learning behavior to achieve the desired effect. Students play in the entire learning process an important role, in a dominant position to learn, and teachers in a dominant position in the learning activities, from counseling, guidance, support and the role of incentives (Walerk, 1997).

2.2.2 Teaching Objectives Should Be Consistent With the Goal of Learning Environments

Learning is always associated with certain situations, the environment is an important condition of innovation ability and improve people's culture. When the original experience is not sufficient to assimilate new knowledge, but also need to create a new learning environment, Encourage students to be able to transform the existing cognitive restructuring. Change the original structure of knowledge, new knowledge to complete construction of meaning. Advance in teaching law requires carefully designed experiments ahead, advanced experimental and theoretical content corresponds to the classroom, In order to achieve "in the limited time and space required to maximize allow students to observe natural phenomena, perception change process, providing more information for reasoning thinking" purposes. Advance Law teaching objectives and students' learning environment objectives consistent, so that each student knows, Teachers question raised in advance what they experiment theory course next problem to be solved.

2.2.3 To Promote the Role of Teachers and Students Change

Advance feedback experiment method requires that, under the experimental guidance of teachers, each student should carefully observing the phenomenon of teachers assigned experiment, record questions raised by teachers. Record issues raised by the teachers. Instructor of students do not understand and do not have to answer the questions raised, to enable students to go on with the problem class thinking. In the process of implementation ahead of the experiment, the teacher is only a guide, organizer. Its main task is to stimulate students' interest in learning, help students form a strong motivation, in line with the teaching content creation scenarios. Teachers are dominant, students are subject. This constructivism "Teachers are students' knowledge meaning construction organizer, mentor, help, collaborators, facilitators, rather than imparting knowledge and instill those." The understanding is intricately interlinked.

2.2.4 Design of the Real Task, Students Apply Knowledge and Self-Learning Ability Capacity

Teaching the principles of constructivism, emphasize the real activity is an important feature of the learning environment, Teachers should use a real task or activity of daily practice based on the integration of content or skills in the classroom; designed to reflect the students after the end of the study in the complex environment of effective action; this is very consistent with the original intention of leading law， Advance law advocate "in the experimental guidance of teachers, It requires students to carefully observe the experimental phenomena of teachers assigned to record the problem posed by the teacher, so that students with problems Lesson down thinking." Advance selection experiments are based on the need to follow theory courses designed for real tasks, Here, the students become the subject of exploration and learning, experimentally observed phenomena lessons and problems encountered will be in the theory class "show."

It can cause problems observed students put forward their own solutions, Inspire them to seek knowledge within the theoretical basis from outside the textbook and the textbook, students self-inquiry and the ability to learn.

2.2.5 Give Students the Autonomy to Solve Problems

Advance feedback experiment method requires experimental guidance teachers' organizations, guide and help students to complete advanced experiments, ask students to self-observation, self-analysis, group discussions, self-addressed. The instructor and the student does not understand the questions raised by having to make a direct answer, Courses allow students to go on with questions thinking. So that students no longer simply rely on teachers to solve their problems themselves, Students self-learning ability and knowledge application ability. This constructivist teaching "give students the autonomy to solve problems, Teachers should stimulate students' thinking and inspire their own to solve the problem", the idea is agree without prior without previous consultation.

2.2.6 Students Are Encouraged to Test Their Views in a Social Context

After leading the experiment, the students are with the answer to the lectures, to advance their theory to explain the phenomenon is correct, it will be verified in the teacher's explanation. Of course, this is the highlight of the contents of teacher-student interaction. Whether students analysis and the answer is correct, Its meaning is positive. Encourage students to reflect on what they learn and the learning process, Develop students' self-control skills to become independent learners.

2.3 Advance Feedback on Specific Aspects of the Experimental Method to Follow the Assimilation Theory

"From perceptual to rational knowledge and spiraling," the understanding of the development path of understanding of the law reveals. In the minds of students is how did it happen? Classroom students to participate in the construction of the course content. The individual life-world experience to learn to understand the concept and principles of the scientific world to establish organic links. This organic link is how some scenes in the minds of students as well? These cognitive changes occurring in the minds of students, we need to look at with a magnifying glass. From the micro level, the assimilation theory can give a good explanation.

Construction of the process of scientific concept of teachers, teaching students through the process of the implementation of conceptual interaction. It is a cognitive process of psychological development, It is based on students' prior knowledge by the assimilation of new knowledge and concepts, and gradually construct a new scientific concept of process. Assimilation refers to the acceptance, absorption, for their own part of the process of consolidation. Swiss psychologist Jean Piaget that "structural assimilation is to integrate external factors in an emerging or already formed". That can also say that assimilation is to obtain new knowledge through the existing cognitive structure.

American educational psychologist Ausubel learn the new knowledge compared to just ship entering port, Central Plains and some knowledge of the brain compared to the anchorage. The special anchors thing called anchor. Our psychologist will translate into new knowledge assimilation of the word a fixed point in the original knowledge. Advance reserved experimental treatment on specific issues, With the knowledge that the host, promote the concept of assimilation (Walerk, 1968).

2.3.1 With the Assimilation of Knowledge Up Lower Bit of Knowledge

As we all know, meaningful learning is through the process of assimilation of old and new knowledge to achieve. Included in the current knowledge about the knowledge structure to go; the current information linked to return to the existing concept; previous cognitive structure changes in the current study the structure and the establishment of new cognitive structures. Feedback experiment in advance of the implementation process, in fact, there have been two assimilation. The difference between these two is divided into upper and lower knowledge of different knowledge.

The first is through assimilation of knowledge to the upper lower knowledge. Experimental class, students under the guidance of teachers to observe natural phenomena theory course required for the purpose of coming, Lower knowledge of these phenomena belong theory. This time, assimilation is difficult. The reason is that the assimilation determine fixed points, not an easy thing to do. It takes time to analyze and judge, even the need to go to study new knowledge to be integrated, Assimilation to find a fixed point.

When the experiment course observe the phenomenon (existence), we can not go to an existing concept to go, previous cognitive structure in the current study will be the impact of structural changes occur, with these questions, the next lesson they try to correlate old and new knowledge, attempt to find the answer in the original structure of knowledge and information. After some reflection, study, discuss, the original concept of change, with an uncertain conclusion came to theory, through the guidance of teachers or guidance. Those individual fragments emotional link, through external individual properties, after thinking abstraction, find something inherent necessarily linked. Those new to have internal logic of learning materials and student relations existing cognitive structure, assimilation and restructuring, resulting in new meaning in the minds of students, Students accepted the new concept and the establishment of new cognitive structures. This is the first time assimilation, That is, from the individual to the general.

2.3.2 Upper and Lower Division of Knowledge Is Relative Knowledge

Students' cognitive activity always follow from concrete to abstract, to a specific order, spiraling. From Ausubel's assimilation theory, the deep thinking can host the concept, principles, and drawings to explain. When the cognitive structure stable and clear upper concepts, principles or issues schema is used to lower the assimilation of facts or problem scenarios, People awareness of the issue can be further nature or "outside to inside" through the phenomenon, That is, from the general to the individual. In the new concept and then to build awareness ahead of the experiment phenomena and to answer related questions. The new cognitive structure of the new concept is the upper knowledge, The experiment phenomenon becomes a lower-level knowledge, Position between the two just reversed, upper and lower division of knowledge is not absolute. This is the second assimilation, Relative first assimilation, it is much easier (Walerk, 2009).

3. THE FUNCTION AND GENERALIZATION OF PRECEDING EXPERIMENTAL METHOD

Advance experimental method in the field of natural science education has a pivotal position, deepening the reform will take the road. Case Study Teaching in electrical engineering, electronics, general physics, modern physics and other courses in advance by experiment. The role of teachers in all aspects of the experiment Experiment Teaching provides a theoretical basis (Wasserstein et al., 2009) g.

The design of preceding experiment need not change our teaching plan for experiment class. And there is no need to design a preceding experiment purposely. According to a certain experiment class, teachers can insert a 10-15 minutes preceding experiment in an experiment class.

If the school is set up for a basic course, the large number of However, several groups of experimental activities are generally carried out rotation. However, several groups of experimental activities are generally carried out rotation. It is difficult to arrange a unified experimental class before a particular theory, This requires teachers to lead "Demonstration Experiment" in the classroom can also play a positive effect (Walerk, & Allner, 1996).

The application of Preceding Experimental Method does not deny other teaching methods. On the contrary, it combines with other teaching methods to produce a better teaching effect (Walker, 2000).

Advance feedback experiment method practice effect be? Through much of the different institutions, different professions and different grade student questionnaire generally reflect the good. 91.7% of students believe that the quality of teaching using this method when compared with the previous post did not use this method has been significantly improved. Its maneuverability is strong, ideal for colleges and universities in various professional teaching natural sciences. (Walker, Allen, Bradley, Ramirez, & Soo, 2005, 2007; Wasserstein et al., 2007).

CONCLUSION

At present, China's colleges and universities already have reserved experiment ahead of the implementation process conditions. Promote the use of advanced law will inevitably bring great social benefits.

Higher education theory is mature, cognitive law, theory of constructivism, assimilation is the backbone of the higher education theory, cognitive law corresponds to the theoretical foundation of the higher education theory and guidance; constructivism corresponds to the teaching of macro process; The micro aspect in away from the assimilation theory teaching. For have a certain teaching experience of teachers, as long as he settled down to careful thinking, Will certainly feel forward feedback experiment method on the guiding ideology and cognitive law is consistent, in the process of knowledge acquisition and the pace of constructivism is that like, on the processing of details and assimilation theory means that is the same. It is the specific practice of cognitive law, it is a model of capacity building, it is a miniature of the assimilation theory application. It's like a shawl of the theory of higher education.

Although it is not so bright waxberry，nor as delicious lychee. But it has a unique "Bitter sweet"，Let a person aftertaste endless. Advanced feedback experiment method is the product of our country's higher education to deepen reform, is indispensable to quality education, innovative talent training means and methods. Its research and exploration, the rich and the development of China's higher education theory and teaching practice is of positive significance and important role.

REFERENCES

Ausubel, D. P. (1968). Educationl psychology: A cognitive view. New York: Holt Rinehart and Winston.

Chen, Q., & Li, R. D.(2007). Contemporary Educational Psychology (2nd edition). Beijing: Beijing Normal University Press.

Gao, W., Xu, B. Y., & Wu, G. (2008). Constructivism Educational Research. Beijing: Education Science Press. [d] He, K. K. (1997). Constructivism: The theory foundation of reforming traditional teaching (part 1). *E-Education Research,* (3), 3-9.

You, Y. M., Wang, B. Z., & You, S. C., et al. (2009). The preceding experimental teaching method's study and application in electromagnetism experiments. *Beijing: Highlights of Sciencepaper Online,* (02).

You, Y. M. (2000). Application of perceding experimental methods in modern physics experiments. *College Physics (Special issue of Physics Education),* (3), 77-78.

You, Y. M., & Wei, L. J., et al. (2005). Application of preceding experimental methods in optics. *Journal of Hebei Teacher's University, 29*(Suppl.), 118-121.

You, Y. M., Wang, B. Z., & Jin, S. L., et al. (2007). A research into cultivating creative talents to deepening educational teaching reform the preceding experimental teaching method's study and exploring. *Journal of Cangzhou Teachers` College, 23*(4), 43-46

You, Y. M., Wang, B. Z., & You, S. C., et al. (2007). Application and extension of Preceding Experimental Methods in practice instruction. *Research on Higher Education(Journal of Nanjing University Philosophy and Social Sciences)*, (92), 47-49.

You, Y. M., Wang, B. Z., Chi, Z. F., et al. (2012). Study on the comparison between the instructive theory constructivism and the preceding experimental teaching method. *International Core Journal of Scientific Research & Engineering Index, 2*(5), 232-236.

Zhang, J. Z., & You, Y. M. (1996). Application of Preceding Experimental Method in Electronic Technology. In X. Y. Liu, Z. K. Pang, & D. M. Zhang (Eds.), *Progress of higher education teaching and research new Proceedings* (pp.66-69). Beijing: China Science and Technology Press.

Zhang, Y. F. (2009). With the aid of superior knowledge, promote the concept of assimilation. *Physical Education, 27*(9), 40-42.

