Innovation in Teaching Content and Training Innovative Talents

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Abstract: The paper describes the relationship which is important between the innovation of teaching contents in deepening teaching reform and personnel training. This article discusses how to carry out the reform and the innovation of teaching content, as well as the teaching practice and experience of training creative talents from the aspects of enriching and improving the inadequacy of the existing teaching materials, being good at collecting information in the teaching content, developing and teaching non-logical thinking, as well as combining the achievements of the research with teaching content, etc.

Keywords: teaching reform, teaching content, innovation, innovative talents, train

1 Introduction

Implementation of innovative education and nurturing creative talents has become the 21st century’s important issues to solve in our country. There is no doubt that implementation of innovative education is a very complicated system project which is related to various aspects such as the innovation of the educational ideas, the reformation of the educational management system, the modernization of curriculum materials, the signification of the educational evaluation, etc. Implementation of innovative education must get along with overall consideration, integrated design and a gradual manner. The curriculum which is used to instructing to educating in the planning in schools and guiding the students to see the world, understand and improve themselves, is a media consisted of a certain goal in educating people, the basic cultural achievements and learning activities. The undergraduates in school primarily accept for the education of various courses, therefore, the objectives and the direction of the reform on education and teaching must be implemented in a specific curriculum ultimately, through the implementation of programs to achieve. Thus, curriculum reform is an important part in the implementation of innovative education, living in a central role. The curriculum reform and innovation must be paid attention to in the implementation of innovative education.

Any curriculum reform is nothing more than teaching content, teaching methods and teaching means to carry out. Among the three kinds of reform, reform of teaching contents should of course be at the core, because the fundamental elements of the quality of teaching are decided by the teaching content. Teaching methods and teaching means are the approach and guarantee to improve the quality of teaching. Curriculum reform and innovation in the teaching reform is a difficult, but it is necessary to deepen the reform of teaching content and innovation to nurture innovative talents. Innovative talents have creative talents. Innovative capability is a comprehensive ability; innovative thinking is the basis and core of innovative capability. Innovative thinking refers to a creative mind, through mind, not only the nature of things will be revealed, but also a unique new way of thinking will be used, on this basis, to create a social value of the new ideas, new theories, new knowledge and new methods. Innovative thinking is inseparable from the scientific way of thinking. The capability of innovative thinking is also a comprehensive ability.

Here’s the author from enriching and improving the inadequacy of the existing teaching materials, being good at collecting information in the teaching content, developing and teaching the mind of non-logical thinking, the combination of the fruit of the research and teaching content as well as innovative teaching content played some few important roles in nurturing creative talents, etc. to talk about the teaching practice and experience about how to reform and innovation of teaching content to nurture students’ innovative thinking ability and creative talents.

2 Enriching the Inadequacy of the Teaching Materials and Developing the
Undergraduates’ Ability of Obtaining Information

Here’s an undergraduate textbook of “Reservoir Physics” chapter II, section I, “Formation sandstone composition and surface area to volume ratio” of the contents, only the sieve analysis method which can measure the grain size of sandstone, while nothing for analysis by sedimentation on smaller particle size. In response to this issue, the author on the basis of research in the mines, not reveal everything about analysis by sedimentation which is used to the determination of the grain size of sandstone in the mine, but on the basis of guiding students to analyze and narrate the Stoke’s formula of the particle settling velocity, giving out the basic conditions of determination, such as suspensions, graduated cylinder, timer, sand, beaker and oven, etc. To inspire and guide students in thinking and discussions to get the principles, methods and steps on how to apply the formula of sedimentation rate to measure and obtain formation sandstone particle diameter and granulometric composition curves. Teaching practice shows that, although not every student will be able to achieve the effect of teachers in pre-designed, there are students who always have a good foundation, like thinking with responsive and active minds, can play an innovative thinking ability inspired and guided by teachers, through the scattered information-gathering and concentration of their thoughts, describe analysis by sedimentation correctly during the discussion in the classroom. By this teaching process, it can improve the students’ ability of analysis, synthesis, abstract, summary, judgments and reasonable and logical thinking ability, which enhance the students’ capability of convergent thinking of innovative thinking ability. At this moment, the teacher who design the class contents will be naturally very pleased, the students who have a correct analysis of the problem even more to stimulate themselves’ desire in the collection and processing of information, the acquisition of new knowledge, new concepts and new methods at the same time to develop their innovative thinking ability, the other students will recognize this as a process of mutual learning, mutual encouragement and mutual motivation. Even some of the students after school will still be in-depth discussion.

3 Training Undergraduates’ Divergent Thinking Ability

Innovative thinking is made up of logical thinking and the non-logical thinking. The logical one is the basic, while non-logical thinking is mainly divergent thinking, it has so many features like fluency, flexibility, independence, multi-sexual, fine, sensitivity, perception and leap, etc. Training students’ innovative thinking ability is to develop logical thinking ability, at the same time, pay attention to training non-logical thinking ability, and therefore achieving the goal of nurturing creative thinking ability.

A subject or a course has always been with its scientific and ideological, which are richfull implication of logical and non-logical ideas. Generally speaking, since most current teaching materials are mainly written in logical thinking, which is pay more attention to emergence of the logic and integrity of the system. So it is easier to find out the idea of logical thinking, while the other mainly dependent on teachers, who should be conscious of the collection and good at developing and researching. For example, in the textbook of “Fluid mechanics in porous medium”, the steady-state flow of oil and gas and non-steady seepage flow are two different concepts. Steady seepage law is the theoretical basis of systematic well testing, and generally the issues of oil and gas deliverability are solved by systematic well testing; while non-steady seepage flow law theoretical basis of pressure transient testing unstable, namely, to determine the formation of dynamic parameters problems by transient testing. The way of thinking above is the logical method. However, whether the data of pressure transient testing unstable can be used to solve the systematic well testing problem? This kind of thinking is the non-logical thinking, divergent thinking and conventional thinking broken. Developing the ideological essence which is implied in the teaching content in-depth, and mastery, inspiring and guiding students to introduce new problems, identify and solve them through logical and non-logical thinking, which makes the teaching that is no longer confined to imparting prior knowledge of “Representation Type” education,
while the shift is to “discovery-based ”education that focused on acquiring and creating new knowledge, based on in the existing one, especially knowledge acquisition method mastered. Another example is that, the existing textbook of “Reservoir Physics” chapter I, "Formation of oil and gas high-pressure measuring physical parameters" section of the content, which is usually introduced two basic approaches of obtaining the physical parameters of oil and gas in the experimental measurement and calculation of charts. However, in the actual development and production of mines there are still numerical simulation of iterative calculation method, empirical formula method of calculation as well as electrical measuring curve method etc. Complement and introduction of these methods, from different perspectives way of thinking to solve the same problem is a characteristic of non-logical thinking. Practical teaching shows that as long as teachers do well in guiding students to compare and analyze the various methods that will enable students to obtain the intrinsic link as well as the similarities and differences among them, access to all kinds of methods of application conditions with strengths and weaknesses; It can provide an optimized method to obtain the necessary physical parameters of oil and gas in the mines. By this process of training, achieving the goal of training college students’ capability of active minds, quick thinking and many novel ways, at the same time he can put forward a large number of options, approaches and recommendations; Developing students from different perspectives and different ways to explore a variety of methods.

4 Combining the Achievement of the Teacher’s Research with Teaching Content

In the textbook of “fluid mechanics in porous medium”, introduced the way of using “pressure build up curve” to determine the productivity of the gas well, but it only applies to the situation with large production and no pollution in bottom. Therefore, using this method will make a mistake in the general gas well; the practicality will be greatly limited. In response to this situation, combining the author’s new research from “the new method of ‘pressure build up curve’ to determine the productivity of the gas well”, into the subsequent course “Testing Methods” from “fluid mechanics in porous medium”, it has received a good result of fostering undergraduates’ innovative thinking ability. From the course “fluid mechanics in porous medium” we have learned, beginning with the method of ‘pressure build up curve’ to determine the productivity of the gas well, based on the evaluation of the advantages and disadvantages and the existing problems, analyzing the inevitable and internal links between the stable and unstable flow that both are completely different under certain conditions, the students can ask questions and find ways to solve the problem. In response to the problems, building up an influential mathematical model to take into account of the conditions of the pollution in bottom-hole and seek its solution, based on it to put forward the steps and methods about the solution, finally shows the correctness and accuracy of the method, adoption of a practical calculation. Through this example, the students were able to accept the teaching content, because it is a progressive manner in terms of the teaching methods. It is a non-logical mind from the way of thinking, so there has been a direct and multi-faceted role and influence to develop the students’ innovative thinking ability.

5 Innovative Teaching Contents Played an Important Role in Training Innovative Talents

The influence of innovative teaching content to train innovative talents mainly manifested in the following aspects.

5.1 Innovative teaching content is the basic of training the undergraduates’ innovative thinking ability.
Using the new method of ‘pressure build up curve’ to determine the productivity of the gas well is an unconventional one, it is a method that two completely different filtration theories under certain conditions produces a new method with cross-cutting, penetration and fusion. Therefore, the teaching content is closer, more direct and easier to train the students’ divergent thinking ability in the teaching of
receiving professional knowledge. Divergent thinking is the most obvious sign of the innovative thinking and the basic of innovation.

5.2 The mind of teaching research is more clearly
Because the teaching content is the research achievement of teachers, thinking about how to use scientific ways of thinking and inspire the students’ innovative thinking ability step by step, will be handier, and play a multiplier effect. Such as the key points of achieving the goal that is how innovative points come true and how to inspire students to achieve the innovative points—the researcher himself is the best teacher.

5.3 Improving the affinity between teachers and students and inspiring the students’ desire for knowledge and innovation
Studying the teaching content above, the students feel the knowledge has received first, its teaching content and related research methods are basically acceptable. More importantly, the students learned a scientific method to research, namely, they learned how to ask questions from the existing problems to the whole process of problem-solving of innovative ways and the processes of thought. This approach is help for studying the problems of their own future jobs. Since the student learned is the subject of teacher’s research, of course the students will be more interested in, and would like to know its inner content. It even has a better advantage of inspiring the students’ desire for knowledge and innovation. At the same time, the spirit of dedication and study from their teachers will make students be more respectful of teachers, so the affinity between teachers and students will be further enhanced. The enhancement of this affinity is conducive to train the students’ innovative thinking ability. Learning the teaching content enable the students to have a more direct and closer knowledge of what the innovation is and how to develop their own creative thinking capability.

Deepening the reform and innovation of teaching content, and training innovative talents is the time made higher demands on teachers. Therefore, teachers must continually improve their own level of teaching and scientific research, mastering a large number of materials about non-logical thinking training related to the teaching, mastery of the whole teaching process, so as to achieve the goal of developing the students’ creative thinking ability and training innovative talents.

6 Conclusion

The paper discussed the important relationship between the innovation in teaching contents and training innovative talents, and practiced it from the aspects of enriching and improving the inadequacy of the existing teaching materials, being good at collecting information in the teaching content, developing and teaching non-logical thinking, as well as combining the achievements of the research with teaching content, etc.

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