INNOVATION RESEARCH OF MORAL EDUCATION BASED ON EXCELLENCE ENGINEER TRAINING PROGRAM

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UDK: 37.034:62-051(510)

Abstract: Many colleges and universities in China have clearly realized that in the process of operating the "Project for Educating and Nurturing Outstanding Engineers" (PENOE), the old educational contents and methods are not suitable for the new developing moral education anymore. Accordingly, as the engineering education is going into reform, it's necessary to make a change and improve the contents and methods in order to help accelerate the reform as well as achieve the educational goals. The paper briefly explains and discusses the theories of PENOE and moral education at the beginning of the thesis; furthermore, with the reform of engineering education as the background, this paper analysis the issues that exist in moral education in colleges and universities and debates why they exist in the first place and comes up with a conclusion and several solutions to solving the issues in the end.

Keywords: Excellent Engineer, Moral education, Innovation Research, Engineering Ethic

1. INTRODUCTION

In June 2010, "Project for Educating and Nurturing Outstanding Engineers" (PENOE) (with a 10-year duration) was drafted and carried out by Ministry of Education of People Republic of China (MEPRC) and its fellow ministries and commissions in order to help China find a new path of industrialization with Chinese characteristics and become an innovation-oriented country as well as strengthen and deepen the strategy of reinvigorating China through human resource development. The aim of PENOE was to create and develop a group of engineering technicians of all kinds who are more capable of innovating and adapting to the development of the economical society (Lin, J. (2011), Wang, H. (2010)).

As an outstanding engineer, he/she does not only possess such basic qualities as obeying the citizen and professional ethics and taking on the community responsibility, more importantly, they must have this specific quality which is determined by the training pattern of PENOE and needs to be spread and passed down in colleges and universities through moral education since the project itself is facing problems. (Sun, Q., & Political, (2006), Zhang, Y. C., & Cao, Q. Y. (2008)).

PENOE has been going on for almost three years and during that period of time, over 190 schools in China have joined the project and have been actively refining and adjusting their plans and methods for training ever since to achieve the educational goal of PENOE. Moral education, on the other hand, as a big part of college-and-university education, it`s old-fashioned contents and methods are not adaptable to the new training pattern and needs to be changed and improved. New requests are made to help create and move forward new theories and thoughts, thus under such new and different circumstances, an innovative research for moral education becomes more meaningful.

2. BRIEF INTRODUCTION TO OUTSTANDING ENGINEERS

Ever since the people's Republic of China was established, especially after it

had reformed and opened to the outside world, its advanced engineering education has made great progresses and accomplishments. More reasonable and proper educational structures and systems have been built, besides that, more and more people have been inspired and motivated to devote their enthusiasms and energy to push China closer to becoming a powerful industrial country and support and help form and complete its industrial system. According to MEPRC's record, there are 3.71 million undergraduate students as well as 470 thousand graduate students majoring in engineering, which are far more than the total amount of engineers in Germany. With the ranking at a high place on the list of the countries with the most college graduates with a degree in engineering each year, we can easily call China one leading country of engineering education. However, it still has a long way to go before we can call it a powerful country of engineering education.

As to change the situation, MEPRC has drafted PENOE and has been applying it since June 2010. It's a big move China has taken in the reform of MEPRC to carry out the contents of Outline of China's Medium-and-long-term Educational Reform and Development (from year 2010 to 2020) and Outline of China's Medium-and-long-term development of Talents (from year 2010 to 2020) as well as to accelerate the process of its transformation from a leading country to a powerful country of engineering education. Its aim is to create and train a group of highly qualified engineering technicians of all kinds who are well capable of innovating and adapting to the development of the economical society, besides, it must serve to help China find a new path of industrialization and become an innovation-oriented country as well as strengthen and deepen the strategy of reinvigorating China through human resource development. By the time of March 2012, PENOE has covered 29 provinces and cities with 194 colleges and universities involved; over 960 engineering educational canter's have been established based on the school-enterprise cooperation for students to do engineering design and practice.

PENOE has three characteristics:

1. The enterprises should be deeply involved in the training of engineers. For a very long period, the enterprises have not really participated in the settings for majors, courses and training molds when it comes to engineering education in colleges and universities, thus, the involvement of the enterprises in the training of engineers should be recognized as something important and necessary as to proceed the project.

2. Colleges and universities are required to train engineering talents by both general and professional standards. The combination of general and professional standards is crucial when it comes to training engineering talents since the ultimate goal of engineering training is to help the enterprises move forward and adapt to the development of the society.

3. Enhance students ability of engineering and innovation. One of the goals of PENOE is that, with the right training mold, the students learn to use what they have learned in class in actual work and from their ability to innovate and practise in the process and help support and push the development of China's science and technology.

3. MORAL EDUCATION

Moral education is a social practical activity where a society or community uses certain concepts, political perspectives and moral standards to affect the members within a purposeful systematically and organized way in order to help them meet the standards of social morality. In addition, moral education is the priority in building the moral and ethical civilization as well as a major method to resolve social conflicts and issues. Marxism, as a scientific theory

and actual belief, plays an important role in school's moral education. Since to the fact that students in college/university are at a crucial stage where their beliefs and perspectives, which are going to affect the rest of their lives, have just begun to form and are still unstable, it's reasonable to spread Marxism through students and help them establish correct and proper view of life and value.

Professional moral education is one of the major contents of moral education. In social value expectations, there are certain professional moral standards and whether or not the students are able to meet those standards directly shows the effects of moral education, like how the students see and treat their future career and whether or not they manage to use their morality to keep their professional behavior under control, they're both determined by their professional morality. To nurture and develop the students professional morality is to enhance their professional moral consciousness, which appears in moral education and also expands into their future career, and that's why to outstanding engineers, improving their professional morality is the goal of moral education and also the key to the education of PENOE.

4. FUNCTIONS OF MORAL EDUCATION IN THE EDUCATION OF OUTSTANDING ENGINEERS

Moral education regards the students as the subject, which aims for creating and nurturing their overall qualities and allowing them to liberally develop.

4.1. Moral education benefits the development of the students' personal qualities

Firstly, moral education helps point the right political direction for the outstanding talents. As a part of college students, the outstanding talents should have faith in the leadership of the Community Party of China (CPC) and their decision to go down the path of communism and learn to merge the central value of communism into their personal values.

Secondly, moral education helps improve and develop the professional morality of outstanding talents. Only with the right and proper professional morality, will the outstanding talents efficiently serve the society as well as achieve their social values when they eventually go into their workplace as the constructors of socialism.

Finally, moral education benefits the outstanding talents' overall development. It is one important goal of moral education to help the students thoroughly develop, which means that the outstanding talents do not only possess the knowledge and skills of engineering, but also the spirit and qualities of civilization. At the same time, psychological education is necessary which helps discover the students' potential abilities and help them from their personality thoroughly.

4.2. Moral education is helpful to develop students' ability to innovate

First of all, moral education is full of knowledge that opens the students eyes, extents their knowledge structure and widens their thinking range. In addition, it allows the students to think in a scientific way and inspires their innovative spirit so that they can actively devote themselves into the developing innovative practice.

Second, moral education provides a suitable environment for the outstanding talents to develop their innovative ability. On one hand, moral education in college and university helps the students realize and recognize the importance in innovation and respects innovative talents and their achievements; while on the other hand, it provides a suitable social environment filled with brilliant public opinion as well

as the spiritual dynamics and social support to discover and develop the outstanding talents' innovation ability.

Last of all, "Practice is the only standard to test the truth". Moral education encourages the outstanding talents to practical activities actively so that they can improve and sharpen their innovation ability and learn to combine book knowledge with practice, which is beneficial to the innovative methods.

4.3. Moral education is helps cultivate the innovative methods

Moral education focuses on the cultivation of the students "personal abilities", of which, the initiative is the basis, while the autonomy is the core, and these two together are the essential conditions in finding a creative method. Initiative, which is the opposite of passivity, controls the subject with an explicit purpose and lets the subject take active actions and use all the positive elements to form a plan. Autonomy, on the other hand, comes with the leadership. Those who are creative are those who are independent, namely, "we are our own masters" and we dominate and control our destiny and are to create and change our future.

Engineers are to invent and create, that is why they see their innovation abilities as their lives, and thus, engineering education must allow the students to grow their personalities to the fullest and help accelerate the development of their innovation ability. Besides, in order to have the students values recognized and their development accelerated, moral education should be "people-oriented", namely, a.Understand and respect the students; b.Inspire and motivate the students' initiative; c. Cultivate the students' abilities to comprehend and solve problems.

5. ISSUES IN MORAL EDUCATION IN TRAINING THE "OUTSTANDING ENGINEERS"

PENOE targets a special group of people of which the educational goals, training molds as well as the teaching contents are evidently although than those of the regular college students, hence, colleges and universities must be aware of the existing problems in moral education, analyze the reasons and come up with doable solutions.

5.1. Educational goals lack pertinence

Due to different social requirements, changes of the times and individual differences, the goals of moral education should also be different in order to help the students grow and develop. However, in the actual operations, colleges and universities tend to set up a standard goal, which oppresses the students to develop their personalities.

With a single educational goal, it's hard to intrigue the trainees of PENOE, thus, to make moral education more of pertinence and create highly qualified and creative engineering talents, instead of spoon-feeding the students, communicate and exchange ideas and thoughts with them; other than that, allow the students to liberally develop their diversity and mobility under certain conditions.

5.2. Educational contents are conservative

The original old-fashioned educational contents cannot keep up with the new developing contents of PENOE anymore, as a result, based on the outstanding engineering talents' academic characteristics and training standards, draft more targeted educational contents as to meet the standards of training the outstanding engi-

neers. Specifically speaking, this goal can be achieved in the three aspects below:

Firstly, engineering is a combination of several different subjects, and with the modern science and technology growing and developing and the engineering complexity increasing, the boundaries between different subjects are becoming more and more fuzzy which tightly connects engineering with civilized subjects like sociology, political science, jurisprudence and culture, which means engineering students must equip themselves with enough humanity knowledge because those who are only dedicated to the skills would never make outstanding engineers.

Secondly, another important training requirement is "facing the world," in another word, the students must be able to and good at accepting and absorbing foreign cultures and successful experience, especially when they are in contact with heterogeneous culture, they understand how to wisely choose and abandon and create new technology in cultural collision.

Finally, even though Marxism is commonly taught in colleges and universities, other political theories that co-exist with Marxism and are trending in other countries are not well-known and easily forgotten, which makes it hard to distinguish when there's nothing to compare with. There is a fact that as China is going through a crucial transformation of its society, yet its moral education is left far behind by its social development, and sadly we can't ignore that.

5.3. Educational methods are not flexible

Moral education should not only stick to being a good way proved by practice, but also keep moving forward with new methods. As for moral education of engineering students, there are a few flexible methods are to be taken into consideration:

Firstly, enrich educational resources. Rely on the enterprises and projects that are large, advanced and representative in the related industries to set up an educational demonstration zone and push forward the theoretical contents of moral education by letting the students experience and understand the enterprise culture, professional qualities as well as the needs and requirements in developing the modern enterprises.

Secondly, enrich the educational carrier. Use educational means of information technology to the fullest, for instance, teachers can use slides or PPT with illustrations and texts on them while teaching to get the students more interested in learning. It helps the engineering talents understand and realize how significant information technology is in engineering practice and lets them be used to extending their creativity with information technology.

6. IMPROVE THE BASIC COUNTERMEASURES OF MORAL EDUCATION IN THE CULTIVATION TO "EXCELLENCE ENGINEER"

6.1. It must comply with the modern educational law

Instead of focusing on spoon-feeding and merely transferring book knowledge, colleges and universities should gradually strengthen the students social and enterprise practice and improve their learning initiative (Li, B., & Xie, B. Z. (2000)), in the meantime, encourage the students to actively do more research-oriented study to improve the students practice and innovation ability. As for the teaching methods, moral education should be integrated into all aspects of engineering talents' professional study such as teaching. Scientific research and social practice; besides, dig in deep and discover an all types of moral education resources and enhance the teachers' moral education consciousness, which is while teaching, they remember to stress

moral education and help the students to naturally and consciously reinforce their ideological and moral self-cultivation and political consciousness while learning professional knowledge.

6.2. Teach the students the definitions and meanings of gratitude and ethics as to increase their feelings of social responsibility

Steer the students behavior in their daily life and imperceptibly influence their everyday life to raise their humanistic concern and let them know that part of their success comes from the society our nation and their family which helps them from the sense of gratitude and turn the sense into the behavior of gratitude and give back to society which will lead to the increase of the outstanding talents' feelings of social and environmental responsibility.

The ethical education of the outstanding engineer (Liu, S. H. (2004)) aims at creating engineers who can take on social responsibility: They understand the influence and impact engineering has on human society and the nature from the global and social perspectives; they understand their professional and ethical responsibility; they clearly know how their job as an engineer affects the humanistic social and natural environments; they comprehend and grasp the ethical standards as well as the related laws and safety standard; they are equipped with the basic ability of moral inference and know how to tell right from wrong.

6.3. Strengthen the outstanding talents' humanistic education

Change the current situation where the engineering talents pay little attention to moral education and strengthen the humanistic education and; based on the education group's characteristics, transform the profound knowledge into something simple with words easier to understand while teaching; Give more examples of advanced figures and their stories in engineering industry to meet the engineering students' spiritual needs; Stress the outstanding spirit and attitude and steer the students to a higher spiritual level.

6.3.1. Enhance the professional moral education of the outstanding engineers

One of the most important contents of moral education is professional moral education, which is also the major means to help the college students form the right professional moral qualities. Plus, as the future engineers, it's necessary for engineering students to cultivate their professional morality of engineers based on their personalities and characteristics (Kuang, Y. (2009)).

As the cultivated targets of outstanding engineers, the engineering students do not only need to obey a few basic professional moral principles and standards such as the principle of collectivism and moral standards of socialism, but also pay more attention to the following aspects：First of all, stress the importance of engineering ethical education in the teaching of moral education. Throw in a few cases which are tightly related to the students future careers and lives to introduce and explain the contents and meanings of what the students are going to do and how it will affect the environment, humans, society, their family and themselves; clarify what qualities of an engineer the engineering-oriented jobs require as well as how to handle the interpersonal relationship in professional activities and events. All of these are significant in establishing the right moral consciousness of the students. Second, improve their legal attainment. In the market economic environment, engineers' economical activities and behaviors are becoming more and more active and some people fail to refuse the temptation of the profits and commit crimes. Actually, there is no un-passable ditch or un-crossable boundary between

moral standards and laws, that is why some related laws and national policies should be taken into consideration when it comes to morale education. While explaining those related laws to the students, it's crucial to use real the cases which that students can relate to arouse their interests in learning and improve the teaching quality.

On one hand, bring in abundance of real case regarding engineering morality and come up with questions for the teachers and students to debate and study; while on the other hand, as to enhance the students engineering ethical consciousness, the principles and consciousness of engineering ethics must be stressed in the students graduation projects, and considered one standard to evaluate the projects. The colleges and universities should try their best to create opportunities and provide places for the students so that they can designedly practice and experience the work at the front line. Involving in engineering design, arrangement, testing and evaluation, they will personally experience and understand the constantly developing influence engineering activities have on humans' lives, and comprehend the rich ethical values in engineering activities.

6.3.2. Focus on engineers' creativity

Engineering students handle professional skills and scientific research, that is what makes it crucial for them to have innovation ability and with solid professional knowledge structure, they are allowed to develop their personalities to the fullest and discover other potential abilities within. Teaching isn't merely about delivering the knowledge or simply knowing something, it's also cultivating the students interests and abilities, thus the teachers should provide a flexible and open learning environment, where the students can select different courses based on their knowledge basis, interests and characteristics in order to inspire their imagination and motive their creativity. To achieve that goal, the teachers are required to provide the students with more selective courses regarding moral education and look for and every single possible resource and make the most of them, so that the students are able to select suitable courses and fully develop their personalities to cultivate their creativity and autonomy (Td Li, (1994)).

Form a moral education study group where the members can finish their assignments through discussing and exchanging thoughts and ideas, which helps expand their thinking range and stimulate their potential in learning. Other than that, the teachers can require the students to consult references, discuss and take advantage of the Internet to do a PPT presentation and answer the questions asked in class, which exposes the students to the latest research on moral education and at the same time compensates for the fact that they lack social and humanistic knowledge to thoroughly improve their overall qualities.

6.3.3. Use new methods of moral education

It is necessary to come up with new educational methods to keep up with the developing society while sticking to the traditional ones when it comes to morale education.

Firstly, strengthen the link to the related enterprises, engineering and project and fully make use of the resources from inside and outside school to help the students comprehend and accept the concept of moral education and put the concept into actions during the practice; establish a demonstration zone of moral education and invite the advanced figures from enterprises or communities to communicate and exchange ideas with the students and encourage them to be a part of the new teaching mold in order to move forward the theory of moral education on how to have the college students personally experience and understand the development of the society,

the progresses made in our economy, China's reform and openness to the outside world and professional qualities.

Secondly, use the Internet to the fullest to make moral education more diverse and resourceful as to increase the efficiency of moral education and its management. In addition, with the help of the Internet, teachers and students can equally communicate and help each other. For instance, polls or psychological tests allow the teachers to understand the students' current thoughts and behaviors and offer moral education and psychological counselling accordingly.

Finally, improve the ideological and political level of engineering teachers to introduce the methodology of moral education while teaching and help enhance and increase the students comprehension of moral education to get them intrigued and motivated in learning.

7. CONCLUSION

At present, there are certain issues existing in moral education of PENOE, which are: a. The educational goals are stiff which are hard to stimulate the cultivated engineers' interests; b. The educational contents are old-fashioned and out of style and are not suitable for PENOE; c. The educational methods are mechanical and fail to inspire the outstanding engineers. Why do these issues exist? Here are the reasons: a. The educational workers don't fully understand the cultivated targets; b. The educational workers are not qualified enough; c. The old and conservative managing system gets in the way of the new exploration in cultivating the outstanding engineers; d. There are not enough investments in resources. So how do we solve the issues? Here are some solutions should be taken into consideration: a. Alternate the perspectives on moral education and enhance the comprehension of the laws to cultivate the outstanding engineers; b. Invest more in the resources of moral education, like providing means and platforms for moral education, to change the current situation where the resource investments of moral education are not enough; c. Perfect the rules and evaluation system of moral education in the training mold of outstanding engineers and accelerate its construction process, where recruiting, training and promoting systems of human resource are established; d. Dedicate to exploring and discovering new contents and methods of moral education while cultivating outstanding engineers; e. learn from foreign engineers' successful experience of moral education in the training mold of outstanding engineers.

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