Construction of BMP Education Reform Model Based on Multi-Element Information for Automation Teaching System

Yan Huo*, Li Feng
School of Information Engineering, Shenyang University, Shenyang 110044, China
huoyansyu@mail.syu.edu.cn

Abstract. With the arrival of the fourth industrial revolution, modern society is accelerating into the era of full intelligence automation. According to the requirements of new engineering construction, guided by the needs of advanced industry and economic development, combining theory education with practice training, a talent education model with general higher education and application-oriented teaching is constructed in this paper. The dynamic model is based on multi-elements including brain training, morality cultivation and practice improvement (BMP). The BMP model for automation teaching system combines the three elements to highlight the characteristics of modern application-oriented professional education, and provide reference for professional education system of automation technology.

1. Introduction
When the new technological revolution is coming, big data, cloud computing, internet of things, artificial intelligence and other emerging automation technologies emerge in large numbers, which provides a good foundation for intelligent automation manufacturing. With the fast development of economy and the deepening reform of education system, applied professional education of automation technology has gradually become an important development direction of modern education. Most of high education systems are based on theory training, but the training of students' practical ability is weak [1-2]. Therefore, it is necessary for senior talent education to constantly bring forth new ideas, comprehensively balance the relationship between theory and skills, and explore the characteristic and targeted modern education ideas [3]. At the same time, with the development of intelligent industrialization, there is a contradiction between the supply and demand of talents. On the one hand, the demand of enterprises for advanced technical talents is increasing. On the other hand, automation graduates lack some skills and qualities to adapt to the economic development. The contradiction between the two parts has been gradually highlighted. In order to alleviate this contradiction, it is one of the effective ways to construct and optimize the modern application-oriented professional education mode in line with its own development.

Application-oriented education for automation technique has been inseparable from the development of society and enterprises, but pure technology training or theoretical learning can no longer adapt to the development of society. The updating speed of knowledge intensive industries is accelerating, which requires the combination of learning ability, theoretical basis and professional ethics, etc. The purpose of the current automation education needs to be further clarified. Based on the theory and practice for engineering training, this paper constructs a multi-element education model with BMP aiming to systematically elaborate the methods of high vocational education. To improve the connection between the operational level and the theoretical level of high vocational education, the
education mode is changed from oriented employment to development driven achieving the scientific and comprehensive development.

2. BMP model

2.1. BMP concept

BMP model is an open model, which means that it is in the length of time, the width of education and the depth of knowledge. The model is based on the development of automation talents, scientifically with the selection of the training methods, and the realization of the diversified development of vocational education. And it can introduce the system quality evaluation method to correct the model deviation. The commonly elements are used in the BMP education reform model including: brain training (B), morality cultivation (M) and practice improvement (P), as shown in Fig.1.

- Brain training (B) is denoted as the cultivation of learning ability. It mainly aims at the cultivation of self-study ability, knowledge reserve and application ability in the future enterprise development.
- Morality cultivation (M) is denoted as moral and ethical shaping. It is mainly to cultivate students' professional ethics and sentiment, the establishment of values, personality shaping and so on.
- Practice improvement (P) is denoted as vocational skill training. It is mainly to cultivate students' practical ability and improve their proficiency for applied automation work.

BMP model is a multi-element model for improving learning ability, morality and practical ability, and it strives to realize the scientific development of talents for automation technique.

![Figure 1. BMP model graph](image)

2.2. Element relationship

At present, the vocational training institutions gradually take the practical ability as the education goal of automation, and offer practical training, factory practice and so on, which can improve the students' operational ability and employment opportunities to a certain extent. However, there are still many differences between actual enterprise work and school practice. With the upgrading of technology and equipment, graduates with automation technique will still face challenges, which make students constantly update and improve their skills. Therefore, it is urgent to consolidate the theoretical basis of students and cultivate their learning ability, which requires students to constantly expand their development space. The development of the former ones is inseparable from the norms of professional ethics. If there is no professional ethics and quality training, the talents still can not be competent for the post and adapt to the development of the science enterprise. From the current development needs of talent market, hands-on ability should still be the main goal of vocational education, but the improvement of hands-on ability is inseparable from brain training. Brain training is also to improve hands-on ability. Both of them are based on moral cultivation. Professional ethics is the guarantee and foundation of hands-on ability and brain training. So the three elements are indispensable. This is the relationship between the three elements of the model for automation technique.
3. Modeling method

BMP model has the characteristics of soft constraints, openness and development. In the process of teaching practice, the main tone of development should be grasped and the all-round development of technical talents should be realized. The detailed contents of the modeling methods are in the following subsections.

3.1. Model realization function

3.1.1. Brain training function
The students' brain is trained systematically to improve their self-study ability, logical thinking ability and innovation ability. It can also cultivate students' self-study ability, thinking ability and innovation ability by setting up pre-class preview, class discussion and group competition.

3.1.2. Morality cultivation function
Based on the education of humanities and ethics, the ideological and political education, traditional moral concepts and modern professional ethics are combined. The modern professional literacy mainly includes teamwork, honesty, and innovation and competition consciousness. In the courses of science teaching, we should focus on the moral cultivation for emotional intelligence promotion, healthy personality shaping, etc.

3.1.3. Practice improvement function
In order to improve the students' operation skills, they can connect with the actual production of the enterprise seamlessly. It is necessary to promote the joint running of schools and enterprises. As an enterprise class, a classroom enterprise not only teaches students theoretical knowledge in the classroom, but also assigns the actual work of the enterprise to the students in the form of tasks. The task-based teaching mode can stimulate students' enthusiasm for learning production skills with the goal of work. In enterprises, the practice supports not only operation skills, but also the working principle and theoretical basis of practical operation equipment.

3.2. Model realization method
Modern teaching methods have been widely used in teaching, as a hypertext information technology, sound, image, text and other elements absorb knowledge. The teaching method can realize students' perceptual and rational dual cognition. By using advanced virtual reality (VR) method [4], the practice teaching mode not only attaches importance to the traditional practical training content, but also combines the advantages and characteristics of virtual reality. Talents can observe the structure and shape of the virtual equipment for VR system, and they also obtain the operation parameters of the equipment in the automatic production process. At the same time, users can use the software integration interface to control and design the operation parameters of the virtual equipment, so as to obtain the operation results. Professional interest can be simulated from the subjective and objective aspects, mainly including the following two kinds. The first one is the stimulation of internal motivation, by mining students' own interest. The second one is the usage of modern tools by finding the exciting point. The stimulation of external power is mainly to create a good environment for development with external control and guidance.

With scientific use of hierarchical and multiple education methods, every student can progress. In teaching and training, we should seek personalized development and avoid standardized production. It is worth noting that it is important to control the borderline at the same time of personality development. The random development is easy to cause deviation from the BMP model basis and affect the quality of education.

3.3. Model evaluation tool
Due to the irreversibility of the time dimension of education stage, regular model evaluation can avoid
or reduce the deviation. BMP model divides high vocational education process into three time scales, and different evaluation tools are used in different stages.

3.3.1. **Entering semester**
In order to clarify the educational objectives of freshmen, the education van is proposed. In the entrance stage, personal information is collected through the interviews with family and friends, personal questions and answers, psychological and vocational tests, and big data internet. Information forms are made to construct each student's vocational education objectives. Professional training plans will be set with multi information. At this stage, the standard method of vocational education belongs to the spiral structure, which needs to be revised and improved repeatedly.

3.3.2. **Middle and late stage**
As a time series forecasting method, Markov chain [5] has been tried to be applied to education. It uses MC to forecast the short-term trend of students, adjust the trend of deterioration in time, and motivate the trend of improvement. It can find students' problems in time, formulate measures in advance, help students adjust their status, and analyze the reasons.

3.3.3. **The whole process of education**
SWOT analysis method [6] is applied for the analysis of education state, which mainly analyzes two aspects. On the one hand, it analyzes the characteristics of the teaching methods used in the early stage. On the other hand, it analyzes the characteristics of students' vocational education. The model timely corrects the problems, and records the database. For the whole process, the feedback evaluation system is used to regularly evaluate the problems in teaching practice and correct the existing problems with information system.

4. **Conclusion**
The BMP education reform model for automation technique is proposed in this paper. It is a soft constraint model. Therefore, with the development of society, the multi primitive driven model will be updated. As an effective modern method for automation technique, the model should grasp the real-time information of the education states. With the model, the comprehensive training and development of talents can be considered as the driving force of education, and promote the new development of application-oriented professional education system for automation technology.

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