

VOCATIONAL EDUCATION AND TRAINING FOR OPERATORS OF MODERN ENTERPRISES

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Index: Vocational Education, Curriculum Development, On Job Training

Abstract: The idea of how to run an effective and efficient vocational education and training system (**EEVETS**) with enterprises is given in this paper. It includes curriculum, teaching method, teaching support, quality control and management, etc. The keys to form **EEVETS** are demand analysis, motivation mechanism, teachers and tutors, quality control and service support. The training system for modern power station operators is briefly given as an example.

INTRODUCTION

As the great and continuous progress of science and technology, the level of equipment of modern enterprises becomes higher and higher. The renewal period of equipment is going shorter and shorter. The damage of accident becomes much serious in huge operating system in modern enterprises. The requirement for operators' ability is much higher nowadays. By analyzing the details of accidents and the situation of the staff (especially the operators) of North China Power Group (**NCPG**), an **EEVETS** for operators is designed and performed. The **EEVETS** has been running three years. More than 200 operators of **NCPG** have been trained for running large power generation system (300MW or larger power generation system). Also, the **EEVETS** is used for other staff as the requirements of enterprises. More than 5000 persons have been trained per year in our college.

DEMAND ANALYSIS FOR EEVETS

The first important thing to construct an **EEVETS** is demand analysis. Several serious accidents happened in 1997 in **NCPG**. As the result of accident investigation, the quality of operators is a concerned focus. The committee of production security of **NCPG** determined that all operators must be well trained for operating the modern power generation system. Beijing Electric Power College (**BEPC**) was appointed for the task. **BEPC**, operation department of **NCPG** and human resource department of **NCPG** organized an investigating project which consists of two aspects: analysis and professional test of staff members. The results are as following:

The academic level of staff is showed as Fig.1. This is one result of analysis of staff members of **NCPG** Company. Here it shows the average academic level is low. There is a great urgent need to add their knowledge both in basic and special courses.

The result of professional test is showed as Fig.2. It indicates their technique and skills are to be improved and operating knowledge as well.

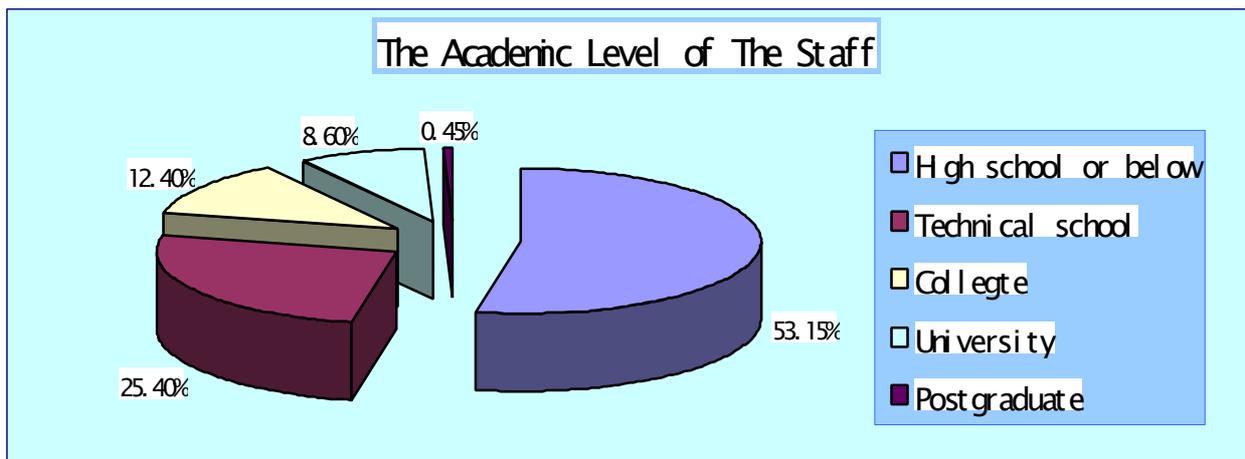


Fig.1 Investigation Result of The Academic Level

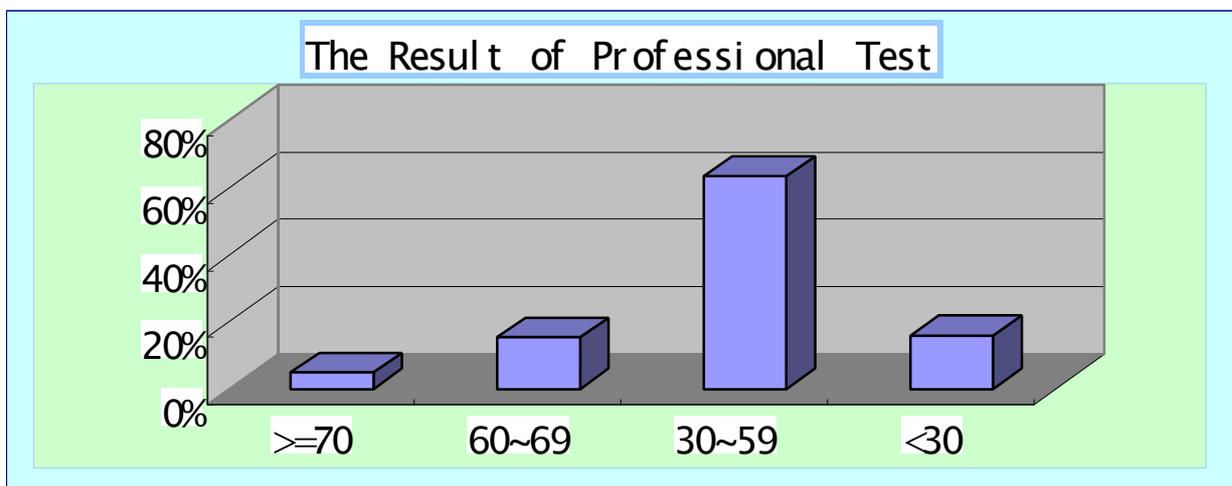


Fig.2 Result of Professional Test (Without Preparation)

Through demand analysis, three aspects of key knowledge are drawn out. They are systematical frame knowledge of running system, special knowledge of normal operation and special knowledge of breaking down accidents. And, the way to strengthen operators' ability of knowledge application is also designed in training system. Training on simulator is an effective way to improve operators' ability highly.

MOTIVATION MECHANISM IN EEFVETS

The second important thing to construct an **EEVETS** is to construct a motivation mechanism for operators' knowledge renewal. A human resource development strategy is settled in enterprise firstly. The purpose of it is to motivate the staff members, managers, in-plant educational departments and vocational education organizations. Following the strategy, an on-job training system is settled with operation system. Each operator is regularly evaluated according to the criterion set by national organization, enterprises association or enterprises itself. Operators can take on operation with a professional license. Those who have not passed will be laid off and they have to get trained until they

pass the training and evaluation. The professional license should be renewed in a certain period of time.

The scholarship is awarded according to the performance. This is also a part of motivation mechanism for operators' knowledge renewal. The vocational education and training organization spread the scholarship to the trainees according to two items: one is scores and the other is a behavior in obeying regulations and partnership with others. The fund of the scholarship is provided by enterprises.

TEACHERS AND TUTORS IN EEVETS

The third important thing to construct an **EEVETS** is a network of high-level teachers and tutors. As we know the feature of power system is technology-centered and integrated, in which large capacity and high parameters generating units are adopted. So it brings about deeper and higher demand for education and training than conventional colleges education and in-plant training. From this point of view we combined the professors in colleges, senior engineers and experienced operators in enterprises into a group that is organized as a dynamic net. Its members are much experienced in education, training and practice and come from all units in north China from decision-making level, management level to operational level.

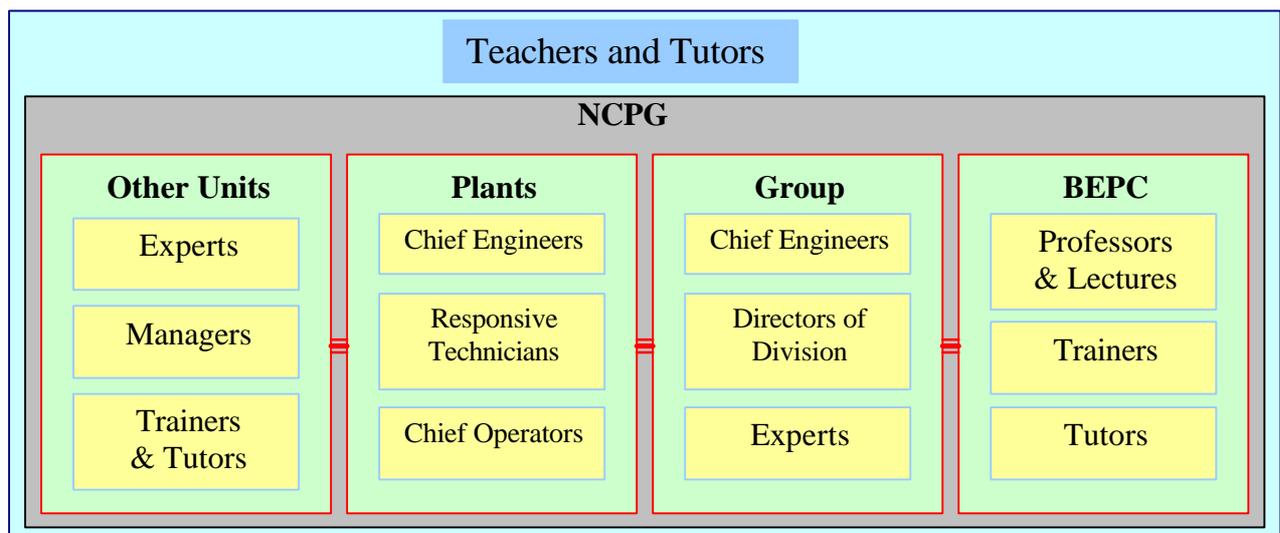


Fig.3 The Network of Teachers and Tutors

The program and syllabus is made by them and suitable curriculum is developed according to the demand analysis. Preparation of the teaching materials is very complicated and needs a great deal of knowledge and experience. The teaching materials are prepared by them.

Simulator-related training is an important part of the training, which accounts for nearly a half of program. The trainers have been trained and got the licenses to take the job.

QUALITY CONTROL IN EEVETS

The fourth important thing to construct an **EEVETS** is quality control. It includes a strict examination system, a thesis tutor system and a committee of evaluation.

Three phases are set during the program. The first one concerns about technical basis; the schedule focuses on basic courses on electrical, thermal and automation technology. The exams are about knowledge. The second one focuses on the operating system which consists of frame knowledge of operating system, special knowledge and application. The exams are about application and analysis of the knowledge. The third one is on the simulator in which the start-up and shutdown of the generating units are presented here and dealing with abnormal situation and accidents are also practiced. The exams are about operating skills and ability to tackle the abnormal situation and accidents. They are operational and practical ones. All exams are supervised by the committee of evaluation.

All trainees are expected to submit papers of which the themes are set based on the actual situation of the trainees' plants, recognized by the experts of that plant and finalized by the committee of evaluation. The guidance is undertaken by both the experts from plants and professors from colleges. The paper defense is conducted by the committee of evaluation.

The main duties of the committee of evaluation are to evaluate instruction of teachers and tutors and learning and practice of trainees as well.

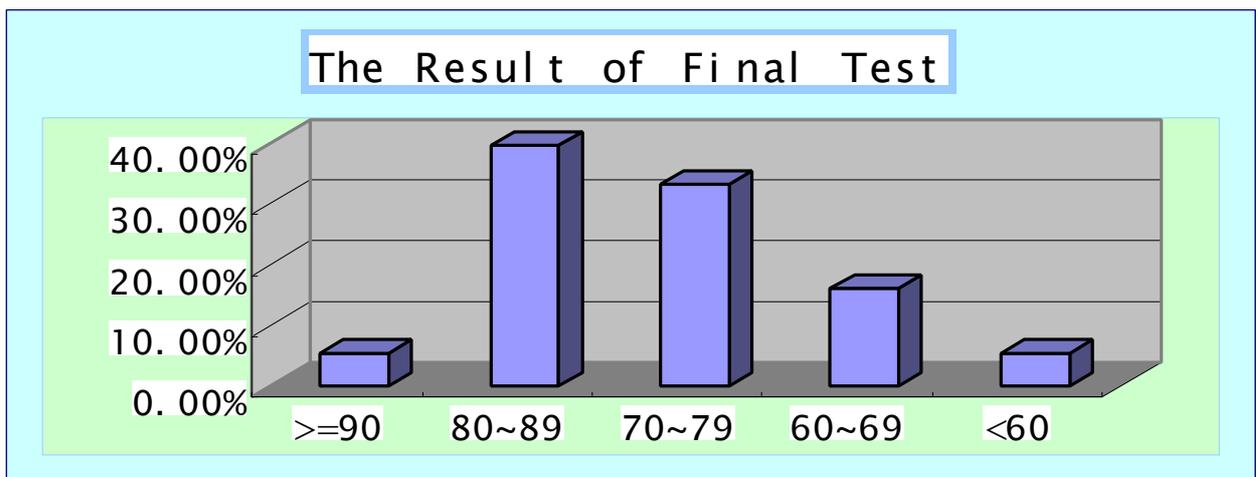


Fig.4 The Result of Final Test (At the End of Program)

The selection of the committee members is done strictly and carefully through the whole area of north China from among well-known scholars and experts. A third come from colleges and another third from power plants, the rest one from other units. The total number usually reaches about 20.

SERVICE SUPPORT FOR EEVETS

Finally, the service support to **EEVETS** is also very important and valuable. The mode of project management is applied to vocational education and training.

A administrative group with the connection and coordination with the enterprises as their duty is set to

conduct the program. This group is also the organizer and coordinator in the college. In this group two divisions are responsible for instruction and services. The teams in the instruction division are responsible for feed-backs of students and evaluation of the teachers and routines etc. The teams in the services provide the accommodation, entertainment, health care and other needs and requirements. Their services are covering both the students and teachers. The existing human resources and equipment in colleges and enterprises are utilized thoroughly for providing the services.

CONCLUSION

With the rapid development of electric industry the linkage between colleges and enterprises becomes more and more tight. Vocational education and training plays a role of reservoir (talents bank) and gas station (life-long learning). The systematic method is applied to put all employees in the parallel orbit so as to optimize production elements, raise productivity and improve the operation of the enterprises wholly.

ABSTRACTS OF AUTHORS

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