Implementation of Work Process Based Curriculum in Technician Institute

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**Background**

- In 2009 the number of “highly skilled personnel” in China had reached 11.725 million, including 2.807 million technicians and 0.982 million senior technicians;
- Highly skilled personnel cannot meet the needs of economic development in terms of either quality or quantity;
- The government takes the building of highly skilled personnel as its most crucial strategy of national development.
- The Ministry of Human Resources and Social Security (MoHRSS) has organized a number of projects so as to establish a highly skilled personnel training system.
- This paper focuses on Technician Institute’s work process based curriculum development as well as the pilot projects designed for this purpose.
**Genesis of the technician**

According to the MoHRSS’s definition, highly skilled personnel consist of higher-level skilled workers, technicians and senior technicians.

Now technicians are no longer traditional craftsmen, they have gradually been required to fulfill tasks that are more comprehensive and that involve work organization and management.

The establishment and development of the professional group “technician” has historically gone through four stages:

- Granted by the government;
- Assessed within sector administrations and appointed by companies;
- Public Assessment;
- Trained by expanding vocational training schools/colleges.
Training of highly skilled personnel is provided by vocational schools/colleges, training centres, and enterprises. Vocational schools are the main force of systematic training of highly skilled personnel thanks to their advantages in number, geographic extension, didactical concepts and training experience. Due to the lack of real work practice, both the occupational community and the educational circles took a sceptical position as to whether the vocational schools would be able to train qualified technicians. Since 2006, technician institutes started to technician training programs, generally set the aim of training “pre-technicians”; but there wasn’t a mutual understanding as to what constituted a pre-technician.
Research questions

- This paper attempts to research on technician’s occupational features and growth patterns.
- It takes six specialties to discuss the training models on the basis of current vocational education system and policies in technician institutes and the curriculum design and planning using work process based approach.
- The six specialties are:
  - CNC-technology, automotive repair, maintenance electrician, welding, toll fitter, animation design and production.
Goals of the project

To investigate technicians’ occupational features and qualification requirements

To find the growth patterns of technicians

To explore technicians’ training model

To develop work process based curriculum for technicians’ training curriculum

To organize trial training, teaching-process observation, seminars and reflection activities

To put forward advices on technicians training
Research activities

The research project started in 2007 and took more than three years, involving 11 technician institutes in six provinces, as well as Beijing Normal University as “wissenschaftliche Begleitung” (scientific guiding).

The following activities have been accomplished during the period.

- Teacher training;
- Sector study and enterprise investigations;
- Implementation of Expert Worker Workshop (EXWOWO);
- Establishing curriculum framework;
- Pilot training;
- Summary and reflection.
Research findings

Occupational profile of modern technicians

* They are engaged in the production and business process within the first line.
* They are experienced and higher skilled, work independently, communicate with other teams or departments, responsible for design, maintenance, etc. in the work.
* They are the core force for the production and usually play a leading role in a complex work process.
* Some technicians also do production organization, train and guide lower-level workers, work as the backbone of their enterprise, improving production efficiency and realizing technology transfer.
Research findings

Occupational profile of modern technicians

- Technicians’ role and responsibilities vary according to the size of enterprises.
- There is a variety of types such as so-called “operational”, “technology-based”, “versatile”, “knowledge-based” technician.
- The “modern technicians”/“new technicians” demonstrate their value in
  - “professional thinking” and “complicated communication”,
  - their work involves both “difficult production - skills innovation - skills passing-on” and “on-site management - technology guidance - technical maintenance - training organization” (Chen 2008)
Research findings

Characteristics of Technicians

- **In a continuous process of practice.** Technicians grow up in continuous production/service practice from low- and medium-level workers, they have a deep understanding of their work place and abundant experience.

- **Have strong competence to adapt.** As a result of technological and organisational development, technicians are often faced with the changing world of work.

- **Their job usually calls for spirit of innovation.** Technicians need to improve or create new tools, participate in new product or technology development activities.

- **Love their jobs and are good at reflection and learning.** Technicians show a high degree of sense of occupational identity and enthusiasm for their work.
Research findings

Characteristics of technician training program

- learning objectives: comprehensive professional competence development,
- combination of professional competences with professional identity, so as to help learners gain the knowledge needed in their work, and connect their personnel skills and talents to their career development;
- integrative learning model of theory and practice, which facilitates students’ overall perception and reflection of the tasks, process and environment in real world of work;
- task-oriented learning situation, in which students work through the complete work process and construct the meaning of learning as well as their social identity in the enterprise
**Theoretical Base**

**Konzepte des Modellversuchs:**  
**- Ebene der Didaktik -**

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<tr>
<th>Lernbereiche (1-4)</th>
<th>Aufgabenbereiche</th>
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<td>1. Orientierungs-</td>
<td>Beruf orientierte Arbeitsaufgaben</td>
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<td>2. Zusammen-</td>
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<td>3. Detail- und</td>
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<td>- Funktionswissen</td>
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<td>4. Erfahrungs-</td>
<td>Nicht vorhersehbar Arbeitsaufgaben</td>
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<td>- Verständniswissen</td>
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**Qualitative Zukunft der beruflichen Bildung: Modell Volkswagen**

Stand: 26.3.2000
Work process based curriculum development

The project tries occupational analysis methods such as

- Sector study,
- Expert Worker Workshop (EXWOWO),
- develops procedures and templates of learning fields description, learning situation design, assignment and Leit-text design, etc.
Process of the Curriculum Development

1. Occupation and work analysis
2. Identify professional tasks
3. Describe Learning fields
4. Learning tasks design
5. Occupation and work analysis
**项目** 描 述

1. 工作与经营过程
   1. 建立运行日志
   2. 拟定保养制度
   3. 拟定安全操作规程
   4. 每月分析1次运行日志
   5. 现场巡查
   6. 解决为题
   7. 根据用电负荷，确定继器设放台数
   8. 根据功率因数调存电信器流量
   9. 总结维修运行经验，并传授给下属

2. 工作岗位
   变配电房管理员，维修工

3. 对象/内容
   运行日志
   保养制度
   安全操作技能
   运行总结分析报告

4. 工具
   电工常用工具

5. 工作方法
   巡查记录

6. 劳动组织
   分组，倒班，组长负责制

7. 对工作的要 求
   1. 熟记安全操作规程
   2. 熟记检查制度
   3. 准确填写表格
   4. 分工合作

8. 综合性问题
   员工须有高度的责任心及熟练的操作技能
**Professional tasks (Learning areas): CNC-Technology**

- use manual tools to create simple parts
- machining simple parts with general machine tools
- electrical wiring installation for machine tools
- numerically controlled batch machining
- programming and operation for single general parts, simple body assembly
- routine maintenance of NC machine tools
- general parts machining process development (internship task)
- manual programming and processing of complex parts, special materials machining
- on-site technical guidance
- NC machine tools’ accuracy adjustment
- NC machining process optimization and improvement (internship task)
- new products trial production,
- tooling design and process development
- site supervision and management
- on-the job training
- handling special parts machining problems (internship task)
Features of the new curricula

* Curriculum framework: designed for the growth path of lower level, middle level skilled workers, higher level skilled workers and technician according to the professional tasks.
* A comprehensive curriculum aiming at cultivating comprehensive professional action competence.
* The curriculum has changed the traditional discipline-based learning and realized the integration of working and learning
* Its content consists of professional knowledge and skill as well as all the elements of work process such work objects, methods, tools, work organization, work requirements.
* The new curriculum is suitable for school-enterprise collaborative training
工作过程系统化的课程

工件制作
室内综合布线
  按图安装一间卧室的电气线路
  一室一厅家居电路设计、预算与施工
电子产品制作
  直流稳压电源的制作
  数字频率计的电路设计与制作
电机修理
  小型变压器制作
  电机重绕
  直流电动机维修
配电房的运行管理

劳动版电工专业教学计划

电工基础
  欧姆定律、电阻串并联...
  正弦交流电、三相交流电......
电子技术基础
  常用半导体器件、放大器基础、
  放大电路中的负反馈......
电工基本技能训练
  钳工、焊工、导线连接......
  常用电工工具......
电机与变压器
  ......
安全用电
  ......
电力系统与运行
Implementation of trial training

* Learning projects come from actual work. According to the principles of professional tasks, real work tasks (such as production and technology transfer project) are chosen and designed as “teaching projects in school” and “internship projects in enterprise”
* The institutes set up integrated learning environment for theory and practice, regrouped their learning resources and established integrated work-learning stations.
* The institutes organized their training process according to the action-oriented principle with emphasis on a complete work process of information, plan, decide and evaluation and have achieved good results.
* Implemented small group teaching with block course arrangement.
* A team of both full-time and part-time teachers was built.
* The institutes developed a series of teaching materials such as learning field description, Leit-texts etc., provided applicable and practical auxiliary materials for students’ self-controlled learning.
Project learning
**Problems**

* There has not been widely recognized in the economic as to whether vocational institutes can train technicians in school-form.
* the new curriculum is very demanding in teachers’ teaching competence and work experience and tends to go beyond their current level.
* the institutes still lack a stable and effective school-enterprise cooperation mechanism.
* the new curriculum calls for changes in the traditional teaching arrangement and training administration system.

This has posed a great challenge to the current vocational education and training administration system.
Model of technician training

- learners
- Relevant agencies
- Relevant systems
- society

- Social status, payment
- Education, employment, finance
- Training organizing, enterprise training, cooperation between schools and enterprises
- Career development
Thank you for your attention!

感谢大家!

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