Inspiration on the Australian Vocational Education and the Referential Significance to SMIC

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***Abstract*—Australian Vocational Education and Training (VET) boasts a perfect system and distinctive features. The Vocational Education Leadership Training Program in Australia has furthered one's understanding of the main characteristics of Australian VET and its relationship with higher education. Technical And Further Education (TAFE) provides a valuable reference to the reform and development of Shanghai Medical Instrumentation College(SMIC) on its way to the improvement of vocational education in the field of medical instrumentation in China and to the implementation of cooperation between college and enterprises and learning in the workplace.This paper summarizes the practice experience and discusses the training of Highly Skilled Talents through college-enterprises Cooperation and provides valuable theoretical basis for the development of vocational education in China too.**

Keywords-Australia; Vocational Education and Training; Training Package; Joint; College-enterprises cooperation

I. INTRODUCTION

Australia is the most economically developed country in the southern hemisphere. It has a long history in vocational education, thus, has formed a modern and sound vocational education system based on technical training and further education. Dating back to the late 19th century, Australia has won world recognition as a well-developed country in terms of education with the most advanced and creative vocational education and training system. In recent years, the Australian government has engaged itself in the improvement of its vocational education system so that the VET) system shall better meet the needs of industries, individual and society, and adapt to changes of the market, technology and economic situations. the writer had participated in the 2010 "Vocational Education Leadership Overseas Training programs" in Australia organized by China Education International Exchange Association. Combined with the actual situation of SMIC, the writer draws on the experience of the VET of Australia and discusses about the practice of the study.

II. THE RESEARCH OF AUSTRALIAN VOCATIONAL EDUCATION SYSTEM

A. An Overview of Australia's Education System

Generally speaking, Australia inherited its education system from British, while maintaining its own unique traits.

TABLE I. AUSTRALIA EDUCATION QUALIFICATIONS FRAMEWORK (AQF)

Sector	*Primary and Secondary Schools*	*Vocational Education*	*Higher Education*
QUALIFICATION LEVEL			Doctoral Degree
			Masters Degree
		Vocational Graduate Diploma	Graduate Diploma
		Vocational Graduate Certificate	Graduate Certificate
			Bachelor Degree
		Advanced Diploma	Associate Degree Advanced Diploma
		Diploma	Diploma
		Certificate IV	
		Certificate III	
	Senior Secondary Certificate of Education	Certificate II	
		Certificate I	

Australia has established its own framework for national vocational education and qualifications (as is shown in Table 1), and launched the vocational education "training package"(TP). In Australia, people receive 6 years of primary school education , 6 years of secondary education, 2-3 years of professional training, and 3 years of college education. Students at grade 12 have two options upon graduation from senior high concerning further education: first, TAFE; Second, university that based on academic research and theories. Australia's vocational education

system facilitates its students to obtain either vocational qualifications or academic certificates.

B. *Framework for Australian Vocational Education*

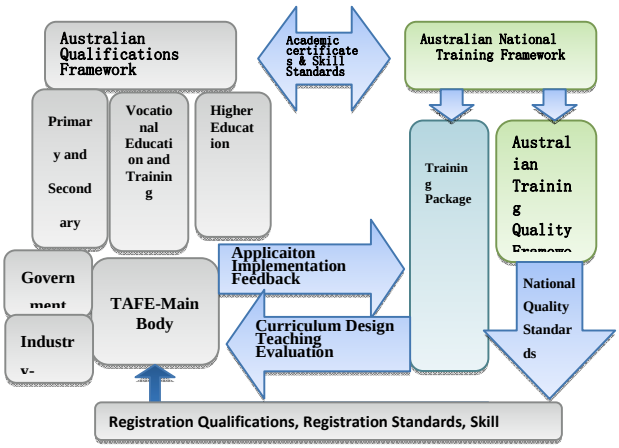

Figure 1. Operation Diagram of Australian Vocational Education and Training System

Australia features three kinds of vocational education and training institutions: public institutions, community institutions; private institutions or enterprise-held training institutions. Among the three, public institutions are dominant while the other two are supplementary. Through ongoing reform and practice, Australian vocational education has formed an excellent education and training system that is government-guided and industry-oriented with Technical and Further Education (TAFE) as its main body, while involving universities, enterprises, and communities. With the Australian Education Qualification Framework (AQF) as its frame of reference, the system provides high-quality education that is supported by the training package, driven by industries, centered on customers, with effective convergence between high schools and universities. (As is shown in Figure 1). TAFE is considered one of the most successful and advanced model of vocational education that has been applied nationwide. It is established by the Australian government, while operated by TAFE, whose advanced diploma, the equivalent of China's vocational education, is issued by the Australian government.

The framework of Australian vocational education involves five parts: Australian Qualifications Framework (AQF), Australian National Training Framework (ANTF), Australian Quality of Training Framework (AQTF), training package (TP), and Technical and Further Education (TAFE). The skill standards under the training framework correspond with a complete set of nationally recognized academic education under the qualification framework. The Australian Quality of Training Framework (AQTF) provides nationwide academic accreditation and quality assurance, while ensures that the qualification certificate issued is valid nationwide.

C. *Symbol of Australian Vocational Education and Training - TAFE*

TAFE provides technical training and further education for secondary school graduates and working people who are not engaged in higher education. It is a unique vocational education system based on the belief of lifelong education that is of no age limit and encourages continuous learning. The multi-cycle lifelong education system that features education - employment – further education – better employment enrolls 70% of Australian secondary school graduates in more than 250 Institutes under TAFE whose curriculum design is based on the professional standards set by industries and certification system set by the government and offers a wide range of professional and practical training programs. The programs are carried out in a flexible manner so that the students may get a one-off pass or arrange the program under different phrases. The graduates enjoy better employment, thus, the programs are universally accepted and welcomed. Boasting a unique style, TAFE has become the symbol of vocational education and training in Australia in satisfying the needs of different industries in terms of its curriculum, competence standards, vocational qualifications, and teaching methods.

D. *"Bible" of Australian Vocational Education - Training Package*

Training package (TP) is a complete set of nationally recognized standards and qualifications, as we can see from Figure 1, that results from the reform of Australia's vocational education and symbolizes the sustainable development of the whole system. It constitutes an important part of the whole competence-based training system in that it sets up the primary standards for the curriculum design and ensures the smooth teaching in TAFE. As the foothold of TAFE and the secret of its success, it is crowned as Australia's VET Bible.

The training package is a set of competence standards established jointly by Australia Industry Training Advisory Board (ITABs), employers and union representatives in 1990s with Industry Skills Council (ISC) responsible for the formulation, maintenance and updating of TP. The training package combines the skills required by different industries with vocational education and training, competence standards with vocational qualifications. TAFE sets the minimum requirements for students to meet its standards, maps out detailed provisions for competence credential, evaluation criteria and the issue of qualification certificates, specifies each and every implementation steps.

III. Features and Experience of Australian Vocational Education

A. *Complete Vocational Education and Training System*

Through years of development, Australian vocational education has formed an integrated and high-quality national vocational education system as it restructures different institutions and improves its legislation. The Australian Qualifications Framework (AQF) which integrates general

education, vocational education and higher education under a series of certificates and diplomas, constitutes an important basis for the entire system, and achieves the interaction and transfer of different levels and types of education (as is shown in Table 1). Australia's vocational education system breaks the boundary between vocational education and general education in the traditional sense. It sees vocational education, vocational training and general education as a whole, and develops a national accreditation system that boasts a clearly defined and interrelated structure. In Australia, 24% of the Institute of TAFE provides students with qualifications, which allow them further education after obtaining the required certificate or diploma or choose the initial level of certificates according to their actual situation. In the learning process, the system gives objective evaluation on the student's previous work, learning and existing capacity so as to help students receive education among different education and training sectors, and flow smoothly from training institutions to the labor market. The accredited vocational qualification certificate is valid nationwide, which promote the standardization of the labor markets, and contribute to the development of one's career.

B. Provision of Knowledge and Skills Required by Industries

Australia has formed an industry-oriented vocational education system. According to the federal government, the Industry Skills Council is responsible for the development of the training package of the very industry. The training package constitutes the basis for the education and training in vocational education and training institutions and highlights the participation of different industries. The competence standards of a training package correspond to the knowledge and skills required by different industries, which forms the basis for the curriculum design and the teaching of TAFE. The curriculum design is supposed to develop competence that meets the requirements of the specific position or positions in the industry. Thus, the Australian VET programs reflect fully the competence required by the national certificate and the needs of different industries.

C. Satisfying the needs of Enterprises and Students

Australia's training package does not specify the way to meet competence standards and obtain qualifications, so students are free to choose their learning pattern. During the training in TAFE institute in Victoria University, the teachers there have clearly pointed out that the key teaching philosophy of Australian vocational education is "Three Questions": what do enterprises need, what do students want to learn, and how do teachers teach so that students get the knowledge and skills they need. During the teaching process, training institutions and trainers will select various teaching modes according to the needs of students and enterprises, competence requirements and teaching environment. All the teaching activities is competence-oriented, student-centered and customer-based. The secret of its success lies in the fact that enterprises have access to the talents they need, while students obtain the vocational qualifications and professional skills required by enterprises.

D. Ongoing Reform on the Joint of Training Packages and College Curricula

The vocational education in Australia goes through ongoing reforms and reflection over its problems during the whole process. Although TAFE acknowledge credits and qualifications among different levels and types of education, there still exist problems, such as the lack of basic knowledge, research capabilities, mismatched skills training courses, etc in the conversion of vocational to higher education, whereupon TAFE Chancellors' Committee has carried out a wide range of studies among its institutions as to the efficient joint of its training packages and university curricula. It is estimated that the curricula and certificates of TAFE will meet the requirements with regard to the courses and the credits received of a first-year university student so as to enable him to move smoothly to the second year of higher education.

IV. INSPIRATION AND REFERENCE FROM AUSTRALIAN VOCATIONAL EDUCATION

A. Promoting the Integration of college, Business, Hospital, Regulatory Bodies and Research Institutions

Australian vocational education system is a government-led, industry-oriented, TAFE-based system involving universities, enterprises and communities, which is of referential significance to the development of SMIC. As a vocational college that cultivates highly skilled graduates in the field of medical instrumentation, which is a risky industry that requires the convergence of a variety of technologies and branches of learning, and the production of diversified, high-tech, personalized, and miniaturized products, the integration and cooperation among colleges, enterprises, hospitals, regulatory bodies and research institutes are needed in fostering talents. SMIC has committed itself to exploring all the advantages it has in the education of medial instrumentation talents to conduct in-depth reform in integrating colleges, enterprises, hospitals, regulatory bodies and research institutes under the guide of state, industry and enterprises. It is necessary to establish a management mechanism that involves three parties: the Education Council, the Cooperation and Exchange Office, and the Profession-Design Body that helps combine work with training. All the three parties must be government-led, industry-oriented, with the cooperation of colleges, enterprises, hospitals, regulatory bodies and research institutes. Key majors (or major groups) are to actively involve in the college-business cooperation, achieve win-win circumstance for different majors and customers, develop efficient Teaching Guidance Committee, establish teaching teams with members of either full-time or part-time background, set up training bases in factories, research and development bases on campus, vocational skills appraisal bases that involve both colleges and enterprises. With the development of teaching teams that include members of either full-time or part-time backgrounds, and of research

and practical capacities, we try to foster highly skilled talents that are of research and practical capacity so as to better serve the needs of society and promote the construction of a long-term stable operation mechanism.

B. Launching the Training of Highly Skilled Talents through college-business Cooperation

Australian vocational education enjoys aspiring interaction among the government, enterprises, and colleges. Students involve not only high college graduates but also apprentice workers who aim at obtaining certain skills or qualifications. The training objectives correspond closely to the needs of enterprises, and the basic courses are conducted in colleges and enterprises alternately. The training projects are developed from real enterprises and the training of practical skills are mainly performed within enterprises. In the training of preparatory technicians under Technician College, we shall make full use of the above experience and encourage the training of highly skilled talents through college-business cooperation.

With the support of local government and related ministries, SMIC has launched the construction of Technician College that involves the cooperation between colleges and enterprises. A total of three Technician Colleges and eight majors have been founded under such circumstance, which promotes the construction of Shanghai public training bases for vocational education. Till now, three training bases have been set up, including Medical Electronic Equipment Training Base, Surgical and Emergency Equipment Training Base, and Rehabilitation Equipment Assembly Training Base. All the efforts are supported by central finance, while many of the teaching materials and test database for the training of preparatory technicians are co-authored by teachers and technical staff from different enterprises, which in turn promote the construction of majors and professional teaching teams with research and practical capacities, greatly enhance the percentage of such teachers, foster much-needed high-skilled talents for the society and enterprises, rationalize the labor force for enterprises involved in the projects.

To strengthen the cooperation between colleges and enterprises in shouldering and allocating responsibility, and carrying out a flexible management mechanism in the running of the training projects, SMIC shall learn from Australian vocational education and training system in designating both enterprises and colleges as main bodies in charge of the projects, taking need of the specific enterprise into consideration and cultivating graduates according to the actual situation of the students and the demand of the enterprise. We shall take industry standards and enterprise demands into account, develop projects from real business experience, integrate business experience into college curriculum, and arrange internships and skills-intensified training in the very enterprise for no less than one-third of the total class period. To ensure the implementation of such mechanism, we shall demand equal investment and subsidy funds from colleges and enterprises while seeking investments from relevant government ministries.

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