Dental Laboratory Technology Education in China: Current Situation and Challenges


Abstract: Modern dentistry and dental education in China were first introduced from abroad by Dr. Lindsay in 1907. However, advancements in the field of dental laboratory technology did not occur to the same degree in specialties such as prosthodontics and orthodontics. Since the 1990s, orders from abroad demanding dental appliances surged as the image of China as the “world’s factory” strengthened. The assembly line model, in which technicians work like simple procedure workers, was rapidly applied to denture production, while the traditional education system and apprenticeship systems demonstrated little progress in these years. The lack of advancement in dental laboratory technology education caused insufficient development in China’s dental technology industry. In order to alter the situation, a four-year dental laboratory technology undergraduate educational program was established in 2005 by West China School of Stomatology, Sichuan University (WCSS, SCU). This program was based on SCU’s undergraduate education and WCSS’s junior college education systems. The program introduced scientific methods in relevant subjects into laboratory technicians’ training and made many improvements in the availability of trained faculty, textbooks, laboratory facilities, and curriculum.

Keywords: dental education, interprofessional education, interdisciplinary education, dental technology, dental laboratory technology, dental technicians, allied dental professionals, China

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It has been over one hundred years since Dr. Ashley W. Lindsay brought modern dentistry to China, where dentistry has been well developed through years of efforts. However, dental laboratory technology has not advanced to the same degree. One important factor is the deficiency in dental laboratory technology education. There are two educational tracks. One is an apprenticeship system, in which students receive hands-on instruction from a dental technician. The other system is the traditional school system, with students studying in vocational school (usually vocational middle school) or junior college for two to three years.

Nowadays, the reform policies and the global economy make China a worldwide producer. Thus, orders from abroad, such as from the European Union and the United States, have greatly increased. Meanwhile, due to its increasing population, the demand for dentures in China is increasing. A report projected that the estimated number of dentists will be 334,000 by 2015, and the proper ratio of dentists to technicians in China is calculated to be 1.3:1, which indicates that China will need 197,000 dental technicians by 2015. That is, China will have 133,000 technicians by 2010 and will need 64,000 more technicians by 2015. Unfortunately, the number of technicians trained through the school system is insufficient, while the apprenticeship system trains technicians who are comparable to assembly line workers. Besides, the school system could not offer adequate training due to insufficient program development, a shortage of funds, and weakness of the teaching structure. Thus, there are great gaps between the temporary situation and the demand for high-quality technicians, educators, supervisors, and researchers in dental laboratory technology.

Similar to the status of medical education in the United States and Canada in the early 1900s, dental laboratory technology education in China has received little attention. Development was hampered by the lack of funds, teachers, and scientifically based curricula and lenient admissions criteria. Innovations were required in order to overcome these deficiencies. After three years of preparation starting in 2002, West China School of Stomatology, Sichuan University (WCSS, SCU) set up a dental laboratory
technology undergraduate training program and recruited twenty-one students in 2005. For the first time, a formal dental laboratory technology education program was established in China. This article describes this program.

**Dental Laboratory Educational Program**

The undergraduate dental laboratory technology educational program at WCSS, SCU set the following five main goals: to train dental technicians, to supply teachers for dental laboratory technology, to train supervisors for dental laboratories, to supply advisors or demonstrators for companies, and to train researchers in dental laboratory technology. To reach these goals, a special purpose fund called the “523 project” has gathered over $500,000 for the undergraduate education system’s construction. The Department of Dental Laboratory Technology was established in 2003, and a dental technician’s training center was built by WCSS, SCU in cooperation with Dentsply Ltd. Faculty members received continuing education (for example, became visiting scholars in the United States, Germany, Japan, and Korea), ten new teaching manuals were written, and other university resources, such as lectures in relevant fields and laboratory materials, were assembled and integrated.

A new teaching system consisting of a three-year curriculum of theory and skill practice courses plus one full year of clinical rotations was established. The curriculum consists of more than forty-five courses, which totaled 196 credits. The courses are divided into five categories: compulsory basic courses, interdisciplinary courses, basic courses in stomatology, major courses in dental laboratory technology, and selective courses (Figure 1). Compulsory basic courses are fundamental science courses or humanistic education courses, such as math, physics, organic chemistry, military theory, and training. Basic science courses provide a solid foundation so that students can apply clinical skills to further research, and humanistic education helps cultivate students’ characteristics. For instance, the course Military Theory and Training improves the student’s sense of cooperation—one of the most important skills for dental technicians to possess. Interdisciplinary courses, such as Coloring and Introduction to Biomedical Materials, are specially designed for dental technology education and have been introduced for the first time. These subjects are related to fields that are critically associated with dental laboratory technology, and they may expand the students’ horizons and broaden their knowledge base for further studies. Basic courses in stomatology are the foundation of dental laboratory technology, and these are followed by major courses.

Entrance requirements have also been raised. Like all other undergraduate students in China, students in dental laboratory technology undergraduate programs must pass the National Matriculation Test (the only entrance exam for university and college, conducted by the Ministry of Education of the People’s Republic of China), in which they are required to score nearly as high as clinical undergraduate students in WCSS, SCU.

There were twenty-one students in the class of 2005, nineteen students in 2006, and seventeen students in 2007. Members of the class of 2005

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<th>Semester 1</th>
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<td>Compulsory basic courses (54)</td>
<td>Interdisciplinary courses (20)</td>
<td>Basic courses in stomatology (46)</td>
<td>Major courses in dental technology (70)</td>
<td>Selective courses (6)</td>
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**Note:** Numbers in parentheses show credit units for each category. The selection and time arrangement of selective courses are determined by the students themselves.

**Figure 1. Arrangement of courses for dental laboratory technology training at WCSS, SCU**
have now been graduates for more than a year, and all of the students have taken jobs in dental laboratory technology and related fields (three teachers in dental laboratory technology, eight technicians, four postgraduates, three dental product demonstrators, and three civil servants in medical fields).

Discussion

The education of dental technicians is not only important for China but for many other countries around the world because of China’s identity as the “world’s factory.” Dental technicians gain professional skills, responsibility, concepts, and many other capabilities through their education. The quality of the dentures they produce relies on much more than just the quality monitoring done by dental laboratories. Improvements are also based on making innovations in dental technicians’ training, bringing in new methods from other educational fields, and trying to incorporate best practices into modern China’s dental laboratory technology programs. In comparison to classic dental laboratory technology education in China, improvements are focused on the following areas: entrance requirements have been raised, basic science courses are included, teaching methods and textbooks have become more refined, teachers have improved, practice courses and clinical practice are prolonged, and training objectives are much more advanced.

The advantages of an undergraduate education are obvious. However, there still remain some issues to be solved. First, the undergraduate students are three years older than vocational middle school students on average, and some senior dental technicians think that younger students may learn faster in the area of skill training. According to the class of 2005, even though they had more practice hours, their skills still needed more development before they were ready for clinical application. Second, it is uncertain whether some courses that were not given by the School of Stomatology contained enough essential necessary knowledge for dental laboratory technology. For example, during the course Basics of Design for Mould and Die (an interdisciplinary course), some students said that they had difficulty integrating dental laboratory technology into module and die design and were unable to make a connection between the two areas. Third, basic courses for both stomatology clinic students and dental laboratory technology students have few differences. It must be questioned whether these students need the same level of instruction in the same courses, in which some students even feel “marginalized.” Fourth, the cultural and hierarchical influences derived from the obstacles between dentist and dental technician made some of the students feel less respected compared to the dental students.

Though initiating change is very hard, the innovations in dental laboratory technology education must go on. Fortunately, this program took the first step. Feedback from the students, the teachers, the college, the university, and society at large are being collected, and from the raw data, we can already see some promising effects on China’s dental laboratory technology industry. Many graduates from the class of 2005 have become faculty mentors in dental laboratory technology institutes across the country in Beijing, Guangxi, and many other places. These recent graduates now educate dental laboratory technology students using advanced concepts and methods.

Conclusions

The lack of talent in dental technology was recognized as a significant problem in China. The only way to improve this situation was to change dental laboratory technology education, with a recognition that substantial efforts should be undertaken in formal education rather than the apprenticeship system. Areas needing the most attention and improvement included the faculty, the curriculum, student admissions criteria, and the employment of graduates. Innovations like those employed by WCSS’s initial program should be continued; only in this way will sustainable development in China’s dental laboratory technology be realized.

REFERENCES