

# Innovation of Dental Education System for Researcher, Dentist, Dental Hygienist and Dental Technician in Hiroshima University

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## ABSTRACT

Hiroshima University Faculty of Dentistry's goal is to become the worldwide research and education center in Dentistry. It seems to constitute the dental education by two missions: core and characteristic. Hiroshima University Faculty of Dentistry has clarified their characteristic mission and improved dental education system to reinforce the innovative part of the education. We started two programs to cultivate researchers/educators who will be a world-wide leader of dental research and education in addition to excellent dental practitioners, the frontier dental science course and the advanced dental clinician course in 2000. The students who completed new education system gave good score to the frontier dental science. The basic clinical knowledge level of students is the same between two courses before starting clinical training. Hiroshima University Faculty of Dentistry had School for Dental Hygienists and Dental Technicians School. These two schools are integrated and reorganized to the School of Oral Health Science in 2005. Hiroshima University firstly established the School of Oral Health Science with four-year programs for dental hygienists and dental technicians in Japan. The liberal arts education is reinforced in both four-year programs. The purpose of our four-year program in oral health science is to cultivate educators in dental hygienists school, researchers in Universities, and nursing teachers who work sickbay of elementary or junior high school. The purpose of our four-year program in oral health engineering is to cultivate educators in dental technicians school and researchers in Universities or dental materials/products companies in addition to excellent dental technicians.

## INTRODUCTION

Hiroshima University Faculty of Dentistry's goal is to become the worldwide research and education center in Dentistry. It seems to constitute the dental education by two missions: core and characteristic. The core mission guarantees the educational quality, namely the medical quality in the dentistry education, and the characteristic mission contributes to the advance of dentistry. Hiroshima University Faculty of Dentistry has decided characteristic mission and improved dental education

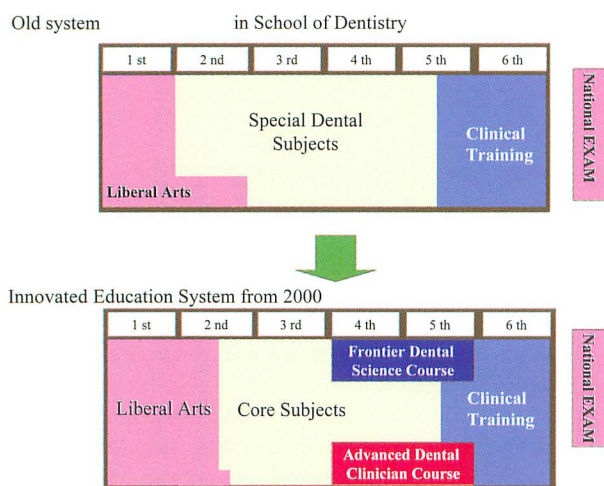
system to clarify the innovative part of the education. We started the programs to cultivate researchers/educators who will be a world-wide leader of dental research and education in addition to excellent dental practitioners in 2000. Also, the education for dental co-stuff is very important to support high level dental treatment because many advanced technologies are introduced rapidly into dental treatment. Common people tend to have interests on prevention of disease, welfare and esthetic treatment because the view of health is dramatically changed in Japanese society. Hiroshima University Faculty of Dentistry had School for Dental Hygienists and Dental Technicians School. These two schools are integrated and reorganized to the School of Oral Health Science in 2005. Hiroshima University firstly established the School of Oral Health Science with four-year programs for dental hygienists and dental technicians in Japan. Here, we introduce our innovated dental education systems for researchers, dentists, dental hygienists and dental technicians.

### Characteristic programs in School of Dentistry, Hiroshima University Faculty of Dentistry

Hiroshima University Faculty of Dentistry was established in 1965. At that time, dental caries and missing tooth and the shortage of dental practitioners were the biggest problem in Japan. Therefore, many dental colleges and dental schools have been newly established and many dentists have been cultivated in 1970s. Now, dental caries in childhood is almost overcome in Japan. It is generally speaking that we are in a supply-demand problem, surplus of dentist. Further, the problems on universal health insurance coverage in Japan resulted in low quality of treatment, because national insurance covers only basic and classical treatment, but does not cover high quality advanced treatments. Patients always request high-quality dental treatment. Recently, view of health has been changed dramatically in Japan; people desire to maintain their youth and beautifulness especially in aged people. These backgrounds of present dentistry and society encouraged Hiroshima University Faculty of Dentistry to reorganize undergraduate education system into two different education courses, the frontier dental science course and the advanced dental clinician course, in school of dentistry in 2000 (Table 1). Students select a course until the end of third grade and

**Table 1** Education system in Hiroshima University Faculty of Dentistry

School	Course	Number	License
Dentistry (60)	Frontier dental science	15	Dentist
	Advanced dental clinician	45	Dentist
Oral health Science (40)	Oral health science	20	Dental hygienist Nursing teacher (optional)
	Oral health engineering	20	Dental technician

**Fig. 1.** Innovated Curriculum in School of Dentistry

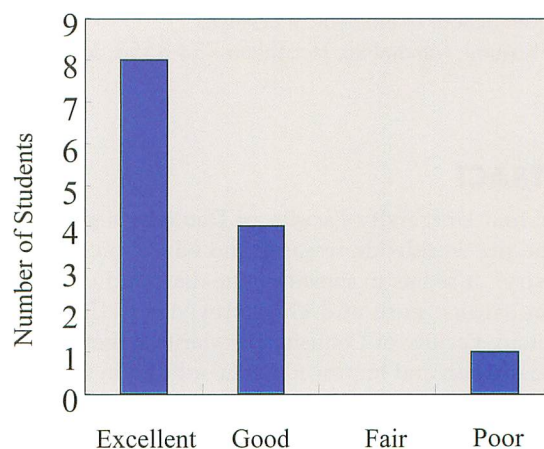
move up to different course from the fourth grade. The curriculum for each course is composed by core curriculum and characteristic curriculum (Fig. 1). The core curriculum is common to both courses and composed by educational requirements for passing the national dentist examination. The characteristic curriculum is served for one and half year, form the first semester of the fourth grade to the first semester of the fifth grade.

#### Frontier dental science course

The students in the frontier dental science course (15 students), the educational curriculum was prepared to cultivate researchers/educators who will be a world-wide leader of dental research and education. The students in the frontier dental science course will basically enter to the graduate school to continue their research and complete Ph.D. program. The students select a major from basic dental sciences: oral biology, oral growth and developmental biology, bacteriology, dental and medical biochemistry, mucosal immunology, biomaterials science, oral physiology, dental pharmacology, and oral maxillofacial pathology. They learn basic concept of research, basic research technique, presentation methods, and scientific paper preparation etc. by small-group instruction. Each student has a simple research project.

#### Advanced dental clinician course

The students in the advanced dental clinician course (45 students), the educational curriculum was prepared to cultivate excellent dental practitioners who can give advanced dental treatments. The students in the

**Fig. 2.** Questionnaire survey on the frontier dental science course

advanced dental clinician course will have lectures and clinical training with models to learn advanced dental treatments, such as dental implant, periodontal tissue regeneration, esthetic dentistry, gene diagnosis for cancer/congenital disease, advanced orthodontics. PBL (problem based learning) and experiential training by small-group instruction are introduced in many classes. We educate capability for self-directed learning.

#### Evaluation of new education system

The first students entered Hiroshima University Faculty of Dentistry in 2000 completed new education courses. The new education system was evaluated by students in each course. We have done questionnaire survey on new education system. The students who took the frontier dental science course are almost satisfied the education program (Fig. 2). Probably, tight communication with students and faculty members by small-group instruction worked well to educate students in the frontier dental science course. Some students presented their research and succeeded to get awards at the student session and the general session in some dental scientific meetings. Almost all students in the frontier dental science course want to move up postgraduate school to continue their research. However, the students who took the advanced dental clinician course gave us low score. They expected to have more clinical training of advanced dental treatment with models instead of lectures. The scores of CBT\* trial between the two courses are the same in average (Fig. 3). However, the scores were widely distributed in the frontier dental science students. We believe that all

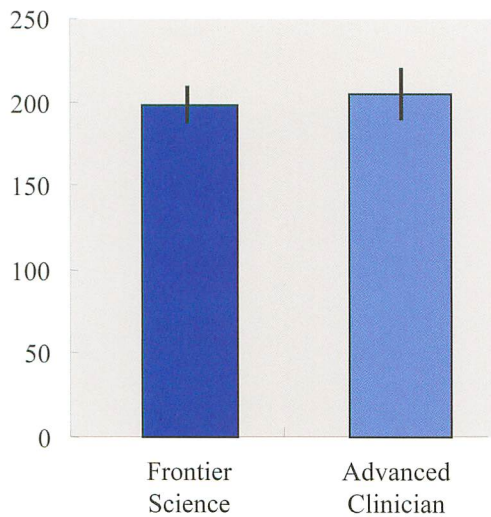


Fig. 3. CBT Trial Score

students educated by new education system pass the national dentist examination.

\*CBT (the computer based test): CBT is the common nation-wide examination. The undergraduate dental students in Japan have to pass before starting their clinical training with real patients from 2006 academic year.

#### Education for dental hygienists and dental technicians in Hiroshima University

Hiroshima University Faculty of Dentistry had School for Dental Hygienists, established in 1976, and Dental Technicians School established in 1972. These two schools are integrated and reorganized to the School of Oral Health Science in 2005 (Table 1).

#### The four-year program for dental hygienists

There are three universities which have a four-year education program for dental hygienists. The four-year program for dental hygienists was firstly introduced at Tokyo Medical and Dental University and Niigata University in 2004 in Japan. In 2005, Hiroshima University firstly established the School of Oral Health Science with four-year programs for dental hygienists and dental technicians in Japan. The education for dental hygienists has been discussed to be changed because two-year program is too short to educate dental hygienists who understand and support recent progression of dental science and dental treatment. Ministry of Education, Culture, Sports, Science and Technology in Japan changed the rule of the required curriculum and the course term for dental hygienists school from two years to three years in 2005. Also, dental hygienists have not educated to have capability for research. The capability of research is most important to chart the future of dental hygienists. The knowledge about basic sciences, such as anatomy, microbiology and biochemistry, and systemic diseases are required for dental hygienists.

Furthermore, the rapid aging of Japanese society resulted in produce the needs of the oral care in senile people who generally have some systemic disease at

institutions for the aged such as special elderly nursing home. At these situations, dental hygienists have to collaborate with other medical stuff, such as medical doctors, nurses, caregiver and clerks. Therefore, liberal arts education is reinforced for four-year program. The education program for taking a license for caregiver was established as an optional program at Tokyo Medical and Dental University and Niigata University.

In Hiroshima University, optional program for taking nursing teacher license is prepared in Oral Health Science Course. Hiroshima University focused on the oral health in childhood and cultivates dental hygienists capable of oral care in elementary school or junior high school. Dental caries in children had been decreased dramatically in Japan. Other dental problems, such as trauma, periodontal disease, and malocclusion have to be pay attention in childhood. Parents tend to give high quality dental care to their children because of decrease of number of children in Japan. For this optional program, pedagogy and practical training at the school are added.

#### The four-year program for dental technicians

The four-year program was firstly introduced at Hiroshima University as a course of the school of oral health science in 2005. Generally, dental technicians are educated with two-year program in Japan. The purpose of our four-year program is to cultivate educators in dental technicians school and researchers in Universities or dental materials/products companies. The curriculum was composed based on the results of questionnaire survey on required curriculums from the companies and on our original education policy. The capability of research is most important to chart the future of dental technicians. Furthermore, it is a different character from medical treatment that many treatment methods in dental treatment are deeply involved with engineering. We want to educate researchers who have knowledge and skill as a dental technician and potential to research and development on the basic engineering aspect of dentistry such as computer graphics, information technology, electric devices, dental treatment robot, CAD/CAM, biomaterial etc. Therefore, we have build up the tight collaboration with Faculty of Engineering in Hiroshima University. We invited a professor from Faculty of Engineering and some lectures were given by the faculty members in Faculty of Engineering. The students have simultaneously dental knowledge and skill and engineering knowledge. We expect that the students in our four-year program may become quite different from students in traditional dental technicians school.

Another purpose of this four-year program is to cultivate who can produce body epithesis based on dental technician's knowledge and skill.

From the results of questionnaire survey of the students in School of Oral Health Science, many students in the oral health engineering course do not have a clear purpose to be in future at present time. This result means there is so many choices what they can become. I believe they will innovate dental science and dental treatments from quite different aspects.