

Innovative Preclinical Dental Teaching and Learning at the University of Manitoba

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The University of Manitoba faculty of dentistry began efforts over a decade ago to integrate the most up-to-date dental education technologies into its preclinical laboratory environment. The faculty now houses 2 modern preclinical laboratories and a dental simulation laboratory that all use high-tech equipment to promote learning.

The mix of technologies and equipment found within these laboratories has evolved, based on input and feedback from teaching staff, the administration and dental students themselves. All of the labs are used extensively, not only during scheduled classes for first- and second-year dentistry and dental hygiene students, but also for self-directed learning and continuing dental education courses.

Manitoba dental students benefit from the modern features of the 2 preclinical laboratories, called the Brass and Hart laboratories. These labs were named in honour of Drs. George Brass and Harold Hart, 2 founding members of the University of Manitoba's faculty of dentistry in 1958. Dr. Brass went on to

serve as head of the department of restorative dentistry until 1979, while Dr. Hart was head of the department of removable prosthodontics until 1975.

The Brass laboratory is equipped with a simulator torso and simulator heads, while the Hart laboratory has simulator heads along with handpiece controls and air-water syringes. Both the Brass and Hart laboratories have 30 individual lab stations, each with a mounted computer monitor that displays images controlled from the instructor's main computer. Each lab bench incorporates a built-in vacuum, a dremel unit, overhead lighting and intraoral unit lights.

The instructor's station is equipped with a telestrater, VCR, slide projector, flexible intraoral cameras and a document viewer. Instructors can project images from either a light and Zeiss microscope, a laptop computer or camera. The main teaching station has 2 wireless microphones that allow an instructor to project audio through the overhead speakers. With all of these tools at the



First-year dentistry students doing work for a dental anatomy and occlusion lab in the Hart laboratory.



Second-year dentistry students in the Brass laboratory using the simulation units for operative dentistry procedures.



Part-time preclinical instructors at the main instructor's station of the Brass laboratory.



A first-year dentistry student practising a Class I preparation on the dental simulation unit.

instructor's disposal, students can easily view and listen to discipline-related clinical procedures and demonstrations on their personal computer monitors. Dental students no longer have to huddle around the instructor to view a technique or procedure.

The dental simulation laboratory has 4 simulator units (3 right-handed, 1 left-handed) along with a simulation head. Each unit has a computer, an infrared camera and LED emitters on the handpiece and typodont. The overhead infrared camera reads these LED emitters and translates the relevant coordinates to the unit computer. Computer software analyzes these coordinates to determine the depth, shape and drill angle of the preparation being worked on. The software also analyzes the preparation in various cross-sections and allows the user to identify deviations from the outline form, depth and axial wall inclinations.

This dental simulation system has a number of benefits, one being that it gives students the opportunity to practise operative procedures in a non-threatening environment. The added benefit of immediate and objective feedback helps both student and professor make any necessary adjustments. Another unique feature is that the system encourages students to maintain proper postural ergonomics while performing procedures. If a student uses incorrect positioning, for example, the camera will be blocked and unable to read the LED emitters on the typodont and handpiece.

Of course, there are some potential drawbacks when using such a wide variety of modern

learning technologies. Instructors must guard against relying too heavily on the computer software to evaluate the students' preparations. Also, the importance of face-to-face dialogue between the instructor and students should never be underestimated. All our instructors make systematic efforts to promote these relationships and engage in personal interactions with students.

The 2 preclinical laboratories and dental simulation laboratory give University of Manitoba students access to the latest dental education technology and equipment. The laboratories also enable professors to apply innovative preclinical teaching methods and provide our students with a solid foundation for building their future clinical dental skills. ♦

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