



## Challenging Students with CAD/CAM technology: Going Beyond the Comfort Zone of Senior Students

Angela De Bartolo, Morey Gendler, David Hershkowiz, Michele Harutunian,  
Denise Estafan

New York University College of Dentistry (United States)

[Adb2005@nyu.edu](mailto:Adb2005@nyu.edu), [mig10@nyu.edu](mailto:mig10@nyu.edu), [dhh1@nyu.edu](mailto:dhh1@nyu.edu), [mmh0079@yahoo.com](mailto:mmh0079@yahoo.com), [de1@nyu.edu](mailto:de1@nyu.edu)

### Abstract

*Purpose: To teach the student doctors to use the new software of the CAD/CAM technology.*

*At New York University College of Dentistry we pride ourselves in challenging the students to reach their potential by imposing requirements that will render them competent in their knowledge and skill of dentistry. In addition to achieving didactic knowledge of clinical procedures, the student doctors are expected to perform different disciplines in dentistry. These include; single unit crowns, fixed partial dentures, implant crowns, and removable prostheses which are all multiple-visit procedures.*

*The use of CAD/CAM technology enhances a student's learning of a particular procedure by projecting a visual image on a computer screen for self- assessment of the accuracy of their work. One way to challenge these students is to give them more exposure Cad/Cam technology. Learning how to navigate the CEREC 4.0 software allows the student to take an optical impression of several teeth in different areas of the mouth in modes of articulation such as maximum intercuspation.*

*The Esthetics Department at New York University College of Dentistry provides an exclusive haven for the third and fourth year students to experience a unique 1:2 faculty/ student ratio and maximize the mentoring and learning relationship. In addition the students are able to take on more complex cases utilizing the state of the art techniques using the software on their laptops and the acquisition unit of the CEREC machine. They can then design, mill, and deliver more than one restoration in one single visit.*

*Conclusion: The use of CEREC cad/cam technology gives student doctors an opportunity to excel both in their clinical practice of dentistry as well as their knowledge and their future in practice.*

### Introduction

Advances in technology must be implemented in today's educational curriculum in order to keep up with the rapid growth and change of the times. Today's millennial students want to be given challenges that enhance their educational experience so that, once out in practice, they will succeed.

At New York University College of Dentistry, we want our students to achieve excellence in learning by exposing them to new technological modalities. Having the student appreciate the significance of doing a multi-step procedure in one visit achieves our goal. The student must be able diagnostically assess the criteria for fabrication of CAD/CAM restorations. With the guidance of faculty in the Esthetics clinic, the patient receives a consultation. The patient, student, and faculty comprehensively agree on a treatment plan and schedule an appointment for the procedure. The Esthetics Clinic allows the student to be able to perform multiple procedures in a single session. With a 1:2 faculty student ratio, the student is exposed to the advanced aspect of dentistry utilizing CAD/CAM technology. In addition, the mentoring- learning relationship between the faculty and student is enhanced. Teaching student doctors innovative CAD/CAM technology allows the individual to develop critical thinking skills that integrate clinical prosthodontic procedures with the precision of graphic design via computer. The application of this computer technology for fabrication of dental restorations is well-received by the computer savvy student as making it a privilege for the senior student.

#### Objectives

To integrate the development of critical thinking in addition to challenges of innovative dentistry for the senior student. The concept of upholding excellence in teaching is a responsibility that we, as clinical educators, must convey to our students so that they, in turn, will become life-long learners.

#### Method

The student, along with standardized faculty will determine whether a patient has a tooth/teeth, that should be restored with an indirect restoration such as an inlay, onlay, or crown utilizing CAD/CAM technology. . Prior to surgical intervention, a preliminary impression is taken and a diagnostic wax up



is done. This is standard protocol and core technique, for any prosthodontic procedure at New York University College of Dentistry, that is required by all students in their respective group practices and the esthetics department. The student places rubber dam in the patient's mouth incorporating the tooth posterior to the tooth that is being prepared and the tooth anterior to the prepared tooth. The student proceeds to prepare the tooth following the core procedure. The student then takes an optical (digital) impression of the prepared tooth and the neighboring teeth, followed by the opposing arch digital impression. In addition, a buccal bite is taken by imaging upper and lower teeth together in maximum intercuspation; all these digital impressions help to generate a restoration that fits accurately and is in proper occlusion. Fig. 1

Virtual casts are viewed and magnified twelve times. The student will be able to view a virtual preparation from the mesial, distal, occlusal, buccal and lingual surfaces. By rotating the image the student can assess whether or not the virtual preparation is adequate to receive a restoration. The student is able to view any undercuts, if present, contact points, (noting if they are too wide or too narrow), and modifying them before the final restoration is milled. The software allows the student to take an optical, impression of several teeth, in a given arch and a centric occlusion; (maximum intercuspation, buccal bite), Fig 2. The student doctor designs the restorations of the virtual cast displayed on the monitor of the acquisition unit. The virtual image can be rotated, and viewed from the mesial, distal, occlusal, buccal and lingual surfaces and modified if necessary. Once the modifications are completed, the restoration is ready to be milled. Once fabricated the restoration is tried in the tooth, if all is well it is cemented with dual cure resin cement. The occlusion is checked after cementation. If a second restoration is indicated on the same patient it can be fabricated on the same day. This is such an advantage in CAD/CAM technology that really is beneficial to both the practitioner and the patient. Fig.3 The procedure from start to finish takes about one hour. The patient is thrilled that the restoration and or restorations are completed in the same day.

## Conclusion

The rationale for continually stimulating our students is to have them be able to understand the value of appreciating constant change and growth in the dental profession. The dynamic innovations that have come to fruition over the past ten years in dentistry have been extraordinary. CAD/CAM technology is the future of dentistry in both a teaching capacity as well as a clinical capacity. The Esthetics program at New York University College of Dentistry exemplifies the progress of such an innovation. The students are able to experience and perform procedures with state-of-the-art technology. The student, the patient, and the faculty are all intertwined in a positive experience beneficial to all. Achieving success in this capacity allows the students to accept new challenges and go beyond their comfort zones.

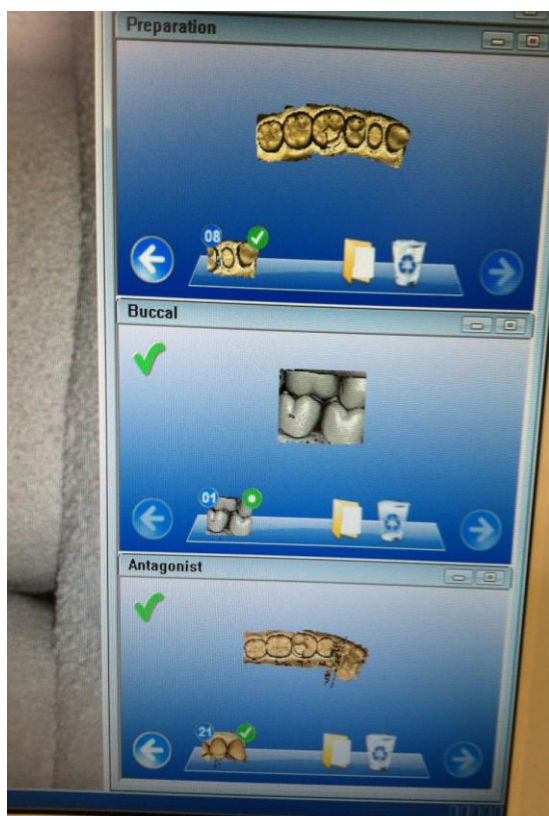


Figure 1

Occlusal view of onlay preparation.

Green check indicates acceptable digital impression

Virtual image of maximum intercuspation

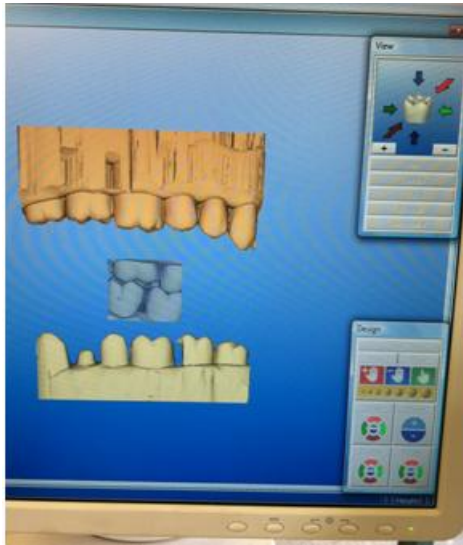


Figure 2

Once the images of the preparation, buccal bite, and opposing arch are acquired the software is programmed to articulate the arches allowing the restoration to be fabricated with precision and accuracy.

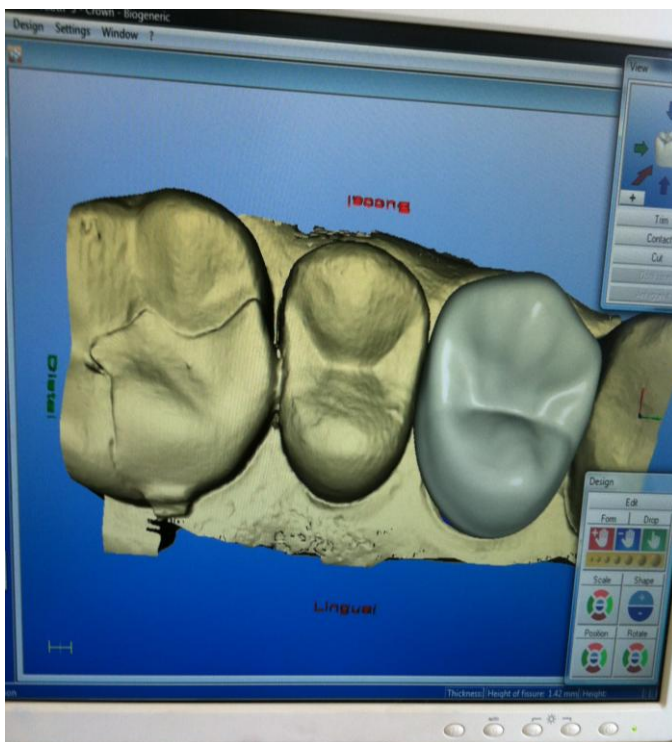


Figure 3

Virtual design of ceramic crown on first premolar.

Note; onlay on first molar already cemented.

Fabrication of multiple restorations in one visit.

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