Oral Cancer Examination: An Interactive Multimedia Instructional Module for First-Year Dental Hygiene Students

Plan B

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RUNNING HEAD: Oral Cancer Examination

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Abstract

The purpose of this instructional design study was to determine whether an interactive multimedia instructional module could teach first-year dental hygiene students the proper techniques of conducting an oral cancer examination.

The participants of this study included 22 first-year dental hygiene students, from a public institution of higher education, enrolled in preclinical dental hygiene courses. The goal of this project was to determine if first-year dental hygiene students in a preclinical course could transfer cognitive knowledge from the multimedia instructional module to performing the oral cancer examination on a real patient.

The psychomotor skills performance assessment consisted of a checklist that gave detailed procedures the dental hygiene students needed to follow in order to conduct the oral cancer examination. The dental hygiene students were required to pass the psychomotor skills performance assessment successfully at a minimum competency level of 75%. Individuals' scores were examined based on the pre-test and post-test scores.

The cognitive aspect was measured by a multiple-choice examination. The examination consisted of 21 multiple-choice questions that were administered before and after viewing the module. The dental hygiene students were required to pass the cognitive examination at 75% competency. Individuals' scores were based on a percentage of the total amount of questions correct divided by the total number of questions.

The demographic survey, the interview questions, and attitudinal survey also served as tools to measure the effectiveness of the instructional module. In addition, the interview questions and surveys were utilized to gather specific information on ways to improve the module and determine what aspects of the module worked best.

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CHAPTER I

INTRODUCTION

Oral cancer is a serious, yet often overlooked problem. In extreme cases, oral cancers may lead to the worse fate of all, death. "Oral cancer is part of a group of cancers called head and neck cancers" (National Cancer Institute [NCI], 2004, Understanding cancer, ¶ 5). There are two types of oral cancers: oral cavity cancer and oropharyngeal cancer. Cancers that are associated with the oral cavity can affect the lips, the inside lining of the lips and cheeks (*buccal mucosa*), the teeth, the gums, the front two-thirds of the tongue, the floor of the mouth below the tongue, the bony roof of the mouth, and the area behind the wisdom teeth. Cancers that are associated with the oropharynx can affect the base of the tongue, the soft palate, the tonsils and tonsillar pillars, and the back wall of the throat (American Cancer Society [ACS], 2004).

According to the Centers for Disease Control (1994), there were approximately 30,000 people diagnosed with oral cancer in 1992 and 8,000 resulting deaths. Unfortunately, these numbers have not gone down in recent years because of patients not seeing their dentist on a regular basis and dentists and dental hygienist not performing an oral cancer examination on all their patients. A new study conducted by the American Cancer Society projected about 28,260 new cases (18,550 in men and 9,710 in women) of oral cavity and oropharyngeal cancer in 2004, resulting in an estimated 7,230 deaths (4,830 men and 2,400 women) (ACS, 2004). These numbers reflect the severity of oral cancer and the need for greater efforts toward prevention.

Needs Statement

Many forms of cancers can successfully be treated if diagnosed at an early stage. Early detection of oral cancer lesions is one of the key components in reducing the morbidity and mortality rates.

According to Gurenlian (2003):

> Many cancerous lesions of the oral cavity are either undetected or diagnosed at a later stage, resulting in a poorer prognosis for the client. Early detection of oral cancer remains essential in changing the outcomes in terms of treatment options and quality of life. (p. 32)

Therefore, it is imperative that physicians, dentists, and dental hygienists perform oral cancer screenings on a routine basis on all their patients.

Performing the oral cancer examination is a vital component of the dental hygienist's role as a dental health professional. Unfortunately, researchers at Case Western Reserve University's School of Dental Medicine have found that "while dental hygienists view screening for oral cancer an important component of their practice and possess comparable oral cancer knowledge with the general dentist in the private practice, they often do not carry out oral cancer screenings" (Griffith, 2004, ¶ 2). In an effort to combat oral cancers, dental hygienists should competently perform this routine examination on all their patients.

Problem Statement

The dental hygiene students, at a public institution of higher learning in the Pacific Rim, are required to perform and successfully pass all preclinical laboratory experiences prior to clinical practice. Currently, there are three to four faculty members, in the Department of Dental Hygiene, who oversee about 20 to 22 students during the preclinical laboratory exercises. Lectures are often done in a two-hour period, consisting mainly of paper-based materials such as textbooks and handouts. A short videotape is shown as an adjunct to the paper-based materials. Unfortunately, the paper-based materials do not provide the students with actual, hands-on experience. The paper-based materials do not give the students a real time view of the actual

process and techniques. The faculty in the Department have expressed that students cannot transfer textbook knowledge to the acquisition of psychomotor skills. In addition, faculty members have also expressed their concerns in finding supplemental teaching materials to enhance the traditional lecture. Psychomotor skill acquisition is a technique that is best taught using one-on-one teaching. However, with the limited time in preclinical laboratory courses, a supplemental material to enhance the traditional lecture would be a useful tool.

To address these concerns, an interactive multimedia instructional module was created to provide an adjunct to the existing oral cancer lecture. Multimedia provided the students with interactivity, access to the material anytime and anywhere, a real time view of the process and techniques using short video clips within the module, and allowed the learner to control the amount of information being delivered through the module.

Accordingly, the purpose of this interactive multimedia instructional module was to test the effectiveness of the instructional module in teaching first-year dental hygiene students the proper techniques of performing an oral cancer examination. Short video clips incorporated into the module gave the dental hygiene students a clearer understanding of the process and techniques involved in the oral cancer examination.

The instructional module was designed to meet both National and State Boards' standards, which dental hygiene students are required to pass. Completing the module permitted the dental hygiene students to competently perform and educate patients on oral cancer. If the dental hygiene students were educated on how to perform an oral cancer examination, detection would increase, leading to effective treatment and improved survival rates.

CHAPTER II

LITERATURE REVIEW

With the high incidence of oral cancer lesions not detected at an early stage, dentists and dental hygienists need to be competent in conducting the oral cancer examination to improve the survival rates. Although dental hygienists cannot diagnose oral cancer, it is still their responsibility to perform the oral cancer examination as part of their routine assessment of their patients. However, many dental hygienists do not perform this vital examination. To address this problem, initiatives must begin with dental hygiene students to provide them with the knowledge and techniques to perform the oral cancer examination competently. Unfortunately, with the limited amount of faculty to oversee each student perform the entire oral cancer examination process, vital areas might be missed or not done correctly. Furthermore, faculty members have expressed their desire to incorporate supplemental materials that will enhance the traditional lecture and provide dental hygiene students with resources to view prior to the laboratory experience.

An interactive, multimedia instructional module was created to teach dental hygiene students the proper techniques of conducting a thorough oral cancer examination. The instructional module was designed based on the framework of the Dick and Carey Systems Approach Model.

The literature review is divided into three major areas. The first part of the literature review focuses on an overview of oral cancer. The second part relates to the design theories and assumptions regarding multimedia and learning. The third part covers how the instructional designer looked for articles pertaining to oral cancer and multimedia. These topics provided a

foundation for designing an interactive multimedia instructional module on oral cancer examination.

Overview of Oral Cancer

Oral Cancer: Incidence and Mortality Rates

Oral cancer is a major problem that can result in permanent disfigurements of the face, tongue and lower jaw. In extreme cases, oral cancer may lead to death. There are two kinds of oral cancers: oral cavity cancer and oropharyngeal cancer. According to the American Cancer Society (2004), oral cavity cancer affects the lips, the inside lining of the lips and cheeks (*buccal mucosa*), the teeth, the gums, the front two-thirds of the tongue, the floor of the mouth below the tongue, the bony roof of the mouth (*hard palate*), and the area behind the wisdom teeth (*retromolar trigone*). The second, oropharyngeal cancer, affects the throat just behind the mouth, in an area called the oropharynx. The oropharynx begins where the oral cavity stops. It includes the base of the tongue (*back third of the tongue*), the soft palate, the tonsils and tonsillar pillars, and the back wall of the throat (*the posterior pharyngeal wall*). Despite the various areas where oral cancer could occur, the most common sites are the tongue, floor of the mouth, gingival, lip, and tonsils (Barnes & Hlava, n.d.). In a study by Nicotera, Gnisci, Bianco and Angelillo (2004), the authors reported 30% of oral cancers originated in the tongue, 17% in the lip, and 14% in the floor of the mouth.

In 1994, the Centers for Disease Control and Prevention reported that there were approximately 30,000 people diagnosed with oral cancer in 1992. Of the people diagnosed, 8,000 resulted in deaths (Centers for Disease Control and Prevention [CDC], 1994). "One American dies every hour from oral and pharyngeal cancers. Oral cancer is more prevalent than cervical cancers, melanoma and Hodgkin's lymphoma" (Gurenlian, 2002, Introduction, ¶ 2).

Unfortunately, these numbers have not gone down in recent years. A new study conducted by the American Cancer Society (2004), projected about 28,260 new cases (18,550 in men and 9,710 in women) of oral cavity and oropharyngeal cancer, resulting in an estimated 7,230 deaths (4,830 men and 2,400 women). The study shows that over the past 10 years, no significant decreases in the number of new cases were reported. Furthermore, no significant decrease in the number of deaths occurred. In order to combat the high incidence, one must consider the risk factors associated with oral cancer.

Risk Factors

Oral cancer is a serious, yet often overlooked problem. Several risk factors have been associated with the development of oral cancer. These risk factors include use of tobacco products, excessive alcohol consumption, exposure to certain viruses (such as the human *papillomavirus*), use of marijuana, and age (Silverman, 2001). Unfortunately, current studies have indicated an increase in oral cancers developing in people who do not participate or engage in these risk factors (Sciubba, 2001; Silverman, 2001). Berry (2001) reported that 25% of oral cancer patients do not fall into the high risk factors category. Therefore, oral cancer examinations should be conducted on all patients, not only those who exhibit the classic risk factors. Conducting oral cancer examinations on all patients can increase early detection of oral cancer lesions.

Early Detection

According to several researchers (Alfano & Horowitz, 2001; Sciubba, 2001; Silverman, 2001), the main reason the mortality and morbidity statistic rate are high is due to the lack of medical and dental health professionals detecting lesions at an early stage. Many individuals who are at risk of developing oral cancer are unaware of the poor prognosis once a lesion is

detected, especially if it is detected at a later stage. If the lesions are detected at an early stage, the five-year survival rate is about 80%, but if diagnosed at a later stage, the survival rate drops to 20% (Horowitz and Alfano, 2001). According to the American Cancer Society (2004), the five-year survival rate is a term that indicates living five years after diagnosis, whether disease free, in remission, or under treatment. The five-year survival rate does not imply that the survivor is cured of cancer.

Silverman (2001) argued that oral cancer screenings took only 90 seconds to perform, but many practitioners were not conducting these examinations. He further argued that the lack of effective professional and public education have contributed to the late diagnosis of oral cancer.

What Is Being Done?

In January of 2000, the United States Department of Health and Human Services, in a coordinated effort with the Healthy People Consortium, provided the nation with objectives to improve their health and reduce the risk of health problems by the year 2010 (CDC, 2004). The Healthy People Consortium consisted of 350 national membership organizations and 250 state health, mental health, substance abuse, and environmental agencies (Healthy People 2010, 2000).

The Healthy People 2010 focused on 467 objectives designed to reduce or eliminate illness, disability, and premature death among individuals and communities. In addition, the Healthy People 2010 focused on objectives to improve access to quality health care, strengthen public health services, and improve availability and dissemination of health-related information.

The Healthy People 2010 reported one of its goals was to increase the proportion of oral and pharyngeal cancers detected at the earliest stage (CDC, 2004). Despite the national objectives for detecting oral and pharyngeal cancer at an early stage, health practitioners still are not conducting the oral cancer examination. Yellowitz and Goodman (1995) reported 82.2% of

physicians and 16.7% of dentists did not complete a routine oral cancer examination for most of their patients. Furthermore, the authors reported that 45% of physicians and 11.3% of dentists did not feel adequately trained to complete an oral cancer examination.

In order to detect oral cancer at an early stage, efforts to increase dental screening and public awareness need to be promoted. In September 2001, the American Dental Association (ADA) started campaigning and advertising across the nation in an effort to make people aware of the seriousness of oral cancer and to encourage them to see their dentist for oral cancer screenings. In an effort to increase the public's awareness of oral cancer, the ADA created and developed posters on oral cancer and the risk factors associated with it. The posters were advertised on billboards, bus and bus shelter signs, taxi tops and commuter bulletins (Berry, 2001). In addition to the posters, the ADA campaigned through television and radio ads to encompass a broader range of people. Furthermore, the ADA and local dentists in New York, Chicago and Dallas conducted oral cancer screenings across the nation in an effort to increase awareness and to detect early signs of lesions (Berry, 2001).

General Practitioners' Role

Several studies and articles (*eg.* Sciubba, 2001; Silverman, 2001; CDC, 2004; ACS, 2004) have suggested that medical and dental health practitioners should perform routine oral cancer examinations on all their patients. In a study by Machperson, McCann, Gibson, Binie and Stephen (2003), the authors reported that primary care physicians indicated that they were more comfortable with the dental health professionals, particularly the dentists, performing the head, neck, and oral cancer examination. Although the primary care physicians feel partly responsible in providing optimum care for their patients, they acknowledged that the dentist and dental hygienist are the major players when it comes to performing the oral cancer examination. The

authors believed the dentist and dental hygienists have more knowledge and better detection skills because of their specialization in working closely with the head, neck, and mouth region.

However, in another study involving Maryland dentists' knowledge on oral cancer, Alfano & Horowitz (2001) reported that dentists and dental hygienists performed oral cancer examinations, but that the majority of the respondents did not palpate, which is an important part of the examination. Furthermore, the study reported that oral cancer examinations were not performed on patients who did not have any teeth.

Researchers have reported that dentists wished they could have further training in detection and prevention of oral cancer (Macpherson et al., 2003, pg. 280). In addition, according to Macpherson et al. (2003), many dentists felt that concise written materials, good visual photographs, and a Compact Disk Read Only Memory (CD-ROM) would provide the necessary training materials needed to keep up with current basic knowledge and skills.

Dental Hygienists' Role

A dental hygienist working collaboratively with the dentist can provide a more thorough assessment of the oral cavity and increase the likelihood of early detection of oral cancer. In the first national study surveying dental hygienists knowledge and oral cancer screening practices, researchers at Case Western University's School of Dental Medicine reported that dental hygienists viewed oral cancer screening an important component of their practice, but often did not conduct the oral cancer screenings (Griffith, 2004, ¶ 2). The researchers randomly mailed out a 25-question survey to 2,000 dental hygienists nationwide with 575 individuals responding to questions about their oral cancer knowledge and oral cancer screening practices (Griffith, 2004, ¶ 7). Of the 575 individuals responding, 53% indicated that they performed the head and

neck examinations on their patients (Griffith, 2004, ¶ 9). Therefore, 47% of the dental hygienists do not conduct this important and vital examination.

In a longitudinal study, Boyer (1992) analyzed the responses of 766 dental hygienists extraoral and intraoral examination practices for new and recall adult and pediatric patients. According to Boyer, 45.6% of the hygienists reported doing the oral cancer examination almost all of the time. Furthermore, Boyer reported 67.8% only performed a visual intraoral examination while 37.4% performed palpation as part of the intraoral examination. An astounding 20% did not conduct an extraoral examination. If you have a systematic process and know the techniques of conducting the oral cancer examination, the actual procedure does not require a long time. Knowing the process and techniques can facilitate a smoother, less time consuming assessment.

Oral Cancer Examination Procedures

Performing the oral cancer examination is a vital component of the dentists' and dental hygienists' role as dental health professionals. However, it does not merely warrant only visual inspection. An oral cancer screening is a combination of visual and tactile examination that takes about 90 seconds (Silverman, 2001).

To conduct a thorough oral cancer examination, dentists and dental hygienists need to learn the basic knowledge and skills required to perform the oral cancer examination. Dental and dental hygiene schools require students to demonstrate minimum competency knowledge and skills in this particular aspect of their studies.

The widely accepted procedure for conducting an oral cancer examination follows the protocol recommended by the World Health Organization (also known as WHO). The WHO was established on April 7, 1948 (World Health Organization [WHO], 2005, About Who, ¶ 1).

The organization is the United Nations' specialized agency for health, consisting of 192 Member States. The objective of the organization "is the attainment by all peoples of the highest possible level of health. Health is defined in WHO's Constitution as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2005, About WHO, ¶ 1). The examination involves (1) extraoral examination (which involves inspection of the neck, head and face) and (2) perioral and intraoral soft-tissue examination (which involves inspection of the lips, tongue, labial mucosa, buccal mucosa, gingival, palate and floor of the mouth) (Horowitz, 2001). The oral cancer examination procedure is widely accepted by all medical and dental health professionals. The procedures are standardized guidelines to ensure that the extraoral, perioral and intraoral sites have been inspected. Several instructional materials have been utilized in the classroom and work place to assist dentists and dental hygienists in conducting the oral cancer examination.

Available Resources for Dentists and Dental Hygienists

Within the past five years, a major effort by government, public, and private organizations has resulted in educational materials being developed to assist the public and reinforce the knowledge and skills in conducting an oral cancer examination. For example, *Detecting Oral Cancer: A Guide for Health Care Professionals*, was a poster created by the National Institute of Dental and Craniofacial Research. The poster graphically depicted the steps of the oral cancer examination. A textbook that is utilized by many dental hygiene schools across the nation is the *Clinical Practice of the Dental Hygienist* by Esther Wilkins. This book, particularly the chapter on conducting an oral cancer examination, incorporated all the necessary information and techniques needed to perform the oral cancer examination. In addition, a paper-based module developed by Rovin (n.d.) titled *Oral Cancer: Detection and Diagnosis*, provided

an additional resource for dentists and dental hygienists to utilize as a supplemental material to learning the techniques of the oral cancer examination. Furthermore, this particular module contained test questions to enhance the learning process. This paper-based module could be utilized as the basis for the development and creation of an interactive multimedia instructional module.

Many of the resources available to dentists and dental hygienists are paper-based with slides to accompany the paper-based materials. Other resources included a short video tape on oral cancer screenings. However, the materials available to dentists and dental hygienists did not show a step-by-step process in conducting the oral cancer examination. For example, to examine the lymph nodes in the neck, one must palpate the entire lymph node chain. The video, *Oral Cancer Screening*, gave a general overview of what areas need to be examined. The Department of Dental Hygiene instructors, in the laboratory course, provided the added step of demonstrating the techniques and process to the students. Subsequently, many of these resources provided systematic steps in conducting an oral cancer examination and many illustrations that promoted a better understanding of relating conceptual ideas to real life situations. What was lacking in the instructional materials was a step-by-step approach using multimedia to enhance the traditional lecture to facilitate a smoother laboratory course. As new technology continues to emerge, many researchers continue to develop and update materials to better facilitate and encompass a comprehensive, effective, and efficient learning tool.

Design of the Instructional Module

Designing an interactive multimedia instructional module to conduct the oral cancer examination procedure required a systematic approach. The framework for design and development of the instructional module was based on the Dick and Carey Systems Approach

Model. According to Dick and Carey (2001), "systematically designed instruction requires learners to interact actively with the instructional materials rather than simply allowing them to read the materials passively" (p. 9). Multimedia instructional materials have been effective and efficient in providing an alternative way to supplement traditional lecture. However, designers and developers of the instructional modules must be careful not to incorporate multimedia haphazardly into the educational materials (Suprise & Mitchell, 1994).

Effectiveness of Video

Many research articles and studies have focused on the effectiveness of videos in educational settings. In *Multimedia for Learning Methods and Development*, the authors stated that "the use of video has opened many opportunities for educational multimedia" (Alessi and Trollip, 2001, pg. 72). "Computer-assisted interactive video instruction is a new technological method that puts the learner (user) in control over the amount of material covered, how often it is presented, and through what medium it is presented" (Sariscsany & Pettigrew, 1997). According to Brandt (1990), interactive video instruction has been shown to be 30% or more efficient than lecture, also yielding greater retention rates than typical group instruction (as cited in Surprise & Mitchell, 1994, p. 529). In a relevant study by Sariscsany and Pettigrew (1997), the researchers studied 77 preservice elementary and early education majors enrolled in the elementary physical education methods course. The participants were randomly assigned to one of the four research groups: (a) interactive video instruction, (b) teacher-directed instruction, (c) teacher-directed video instruction, and (d) the control group. The results from this study showed that there was a significant increase in test scores in the interactive video instruction group compared to the teacher-directed instruction, teacher-directed video instruction, and the control group. In addition, Suprise and Mitchell (1997) stated the following:

> Interactive video instruction is particularly effective for training motor skills, procedures, or processes. Dowding (1991), states, for example, that interactive video is extremely effective in providing instruction and performance in advanced operations and tactical decision-making through simulation of tactical situations. For these tasks, interactive video instruction can utilize behavioral modeling techniques to teach procedures or skills. The required skill or procedure can be displayed through a video presentation, an "expert" can demonstrate the correct performance while clearly delineating each step, and then students can be required to practice the procedure through simulation of the operation. The ultimate purpose of education and training is to enable the students to use the skills and knowledge gained in the classroom to accomplish meaningful goals in the real world. Interactive video instruction that closely simulates the real-world environment can prepare the students for those experiences. (p. 531)

Web-based Instruction

With the rapid growth of the World Wide Web, many educational institutions are providing students with alternative materials to supplement traditional lectures. According to Renold and Bucur (2000), the Web-based format gives the students the opportunity to access information and participate at different times and places than in a classroom (as cited in Gallagher, Dobrosielski-Vergona, Wingard & Williams, 2005). The Web-based format allows

courses that may have conflicted with the students' schedule to be taken at the students' discretion.

Khan (1997) defined Web-Based Instruction (WBI) as a hypermedia-based instructional program which utilized the attributes and resources of the World Wide Web to create a meaningful learning environment where learning was fostered and supported (as cited in Henke, 2001, p.5). Research and studies on WBI have shown that it could be as effective and efficient as traditional lecture courses. In a pilot study conducted by Gallagher et al. (2005), the researchers studied 34 dental hygiene students and other health disciplines enrolled in a gerontology course. The researchers compared 11 students enrolled in the Web-based course and 23 students enrolled in traditional classroom. The results of this study showed that 50% of the students enrolled in the Web-based course found it beneficial, compared to 31% of the students in the traditional classroom. Furthermore, the researchers reported that students in the Web-based course scored higher on the second exam and the case study project leading the researchers to reveal "students in the Web-based course had greater success in accomplishing the learning objectives compared to the students in the traditional classroom course" (p. 7).

In a study by Newlin, Lavooy and Wang (2005), the researchers studied 91 students enrolled in various upper-level psychology classes who had no experience with a Web-based course. The students were randomly assigned to conventional lecture, synchronous Web-based, and asynchronous Web-based. Synchronous Web-based communication means that people can communicate both ways at the same time, whereas asynchronous Web-based communication means that there is a time lag between communicating with the other party (Alessi & Trollip, 2001). The results of this study showed that there was no difference in performance between the

Web-based lecture and the conventional lecture format. Therefore, the researchers concluded that Web-based courses were just as effective as the conventional lecture formats.

In a similar study by Howerton, Enrique, Ludlow and Tyndall (2004), the researchers studied 75 first-year University of North Carolina dental students enrolled in an introductory radiology course. The study compared computer-assisted instruction (CAI) with lecture format. The students were randomly placed in the interactive CD only, interactive CD and lecture, and lecture-only groups. A pre- and post-test was administered to determine if there was a difference between the three groups. The results of this study showed that there was no difference between CAI and lecture-only courses, but students in the CAI program preferred the interactive instructional module because of its convenience and ease of navigation.

Effectiveness of Multimedia

Prior to the introduction of interactive multimedia instruction, many dental and dental hygiene schools utilized a paper-based form of instructional module that included the use of slide films. An interactive multimedia instructional module will serve to convey instruction in a manner that permits the students to gain information at their own pace, review information as necessary, and create their own knowledge structure of the information presented (Cairncross & Mannion, 2001). In another study, Cruthirds and Hanna (1997) also reported that "learners were freed to follow their own enthusiasms, at their own speed; studying only those parts of a text they needed or wanted to study" (pg. 3). A study conducted by Aly, Willems, Carles and Elen (2003), reported that "interactivity is the main strength of multimedia" (pg. 20). Furthermore, Aly et al. (2003) reported that interactivity systems allowed learners to take greater control and, hence, responsibility for their own learning process, thereby becoming seekers of knowledge, not just recipients of instruction (pg. 20). There is evidence that interactive multimedia instructional

modules facilitated learning and allowed students to have control over their learning process. Multimedia instructional modules have provided the means for this type of learning to occur as more and more people are aware of the profound impact they have on delivery of instructional materials.

As discussed above, although there is no significant difference in learning from a traditional lecture format than from a multimedia format, students seem to favor the latter. With an interactive video component added to the instructional module dental hygiene students will be able to view the module and perform the skills needed to conduct the oral cancer examination.

Conducting Literature Research

There were many articles and research related to oral cancer. However, there were a limited number of research articles pertaining to oral cancer examination and interactive multimedia. The University of Hawaii at Manoa Library database was utilized to conduct a search of pertinent information relating to oral cancer and interactive multimedia instruction. In one database, Academic Search Premier listed 2,389 articles relating to interactive multimedia. Unfortunately, only one article turned up when dentistry was chosen to limit the search. In another database, Medline listed 151 articles relating to interactive multimedia, but after narrowing the search to dentistry, only 10 articles appeared. In another database, CINAHL listed only 63 articles relating to interactive multimedia, and only one article turned up that pertained to dentistry. Furthermore, in still another database, a search for the keywords, "professional development," listed zero articles pertaining to interactive multimedia and dentistry. Other searches utilizing the same databases were conducted with "dental hygiene" and "multimedia" but zero articles appeared. According to Gallagher et al. (2005), "the amount of research concerning dental hygiene student performance in distance education is limited" (p. 2).

Therefore, because of the lack of information and training materials for dental hygiene students, the instructional designer studied the literature to determine whether or not the design of an interactive multimedia instructional module could assist dental hygienists to become knowledgeable and competent in conducting the oral cancer examination.

Conclusion

Many articles and studies have shown the need to conduct oral cancer examinations on a routine basis. If oral cancer examinations were conducted on a routine basis, detecting lesions at an early stage would have a favorable outcome for the patient. Although many medical and dental health professionals understand the need to perform this routine examination, many do not.

Noticeable gaps that exist along the educational and clinical practice of the dental health professionals involved the lack of information pertaining to dental hygiene coursework. Many of the articles and research dealt with how dentists learned and performed. There were minimal articles or research studies that focused on the dental hygienist in an educational setting. Additionally, many of the articles were geared toward educating the patient, but not many articles dealt with student development, especially on the acquisition of psychomotor skills. An advantage of acquiring psychomotor skills would be to create an interactive multimedia module that would permit the students to learn and gain information at their own pace. The multimedia module would give the students an opportunity to interactive with the module and also provide an adjunct to the existing lectures.

With the advent of newer and more exciting technology, many researchers are developing course materials that would be suitable for integration with their delivery of instruction. One such method was the development of an interactive, multimedia, instructional module that was

utilized to help dental hygiene students develop their psychomotor skills on conducting an oral cancer examination. Once knowledge and skills were developed, the student dental hygienists were able to conduct routine oral cancer examinations in a systematic and logical manner, potentially saving a number of lives.

CHAPTER III

METHODOLOGY

Goals

The goal of this interactive, multimedia, instructional module was to provide dental hygiene students with the knowledge and psychomotor skills necessary to perform a competent head, neck, and mouth examination on a routine basis. Although dentists are primarily responsible for performing this non-invasive but critical procedure, it is important to have both the dentist and dental hygienist perform the examination to provide a complete and thorough assessment. Therefore, it is important for dental hygiene students to be competent in the knowledge and psychomotor skills to perform this vital component of the examination. Accordingly, the purpose of this interactive multimedia instructional module was to test the effectiveness of the module in educating dental hygiene students about oral cancer examination procedures and how to perform the proper oral cancer examination techniques. Short video clips were incorporated into the module to give the dental hygiene students a clearer understanding of the process and techniques involved.

Systems Analysis

A systems analysis was conducted to identify the various entities that impacted or affected the learner. The systems analysis consisted of three major components: 1) subsystem, 2) system and 3) the suprasystem. As seen in Figure 1, the dental hygiene student is at the center of the system, as depicted by a square box. The oval shaped images consist of subsystem factors that had an influence on how the dental hygiene student receives, perceives and values the information. The rectangular shaped images consist of system factors that also had the same type of influence on the dental hygiene student. Finally, the triangle or pyramid shaped images

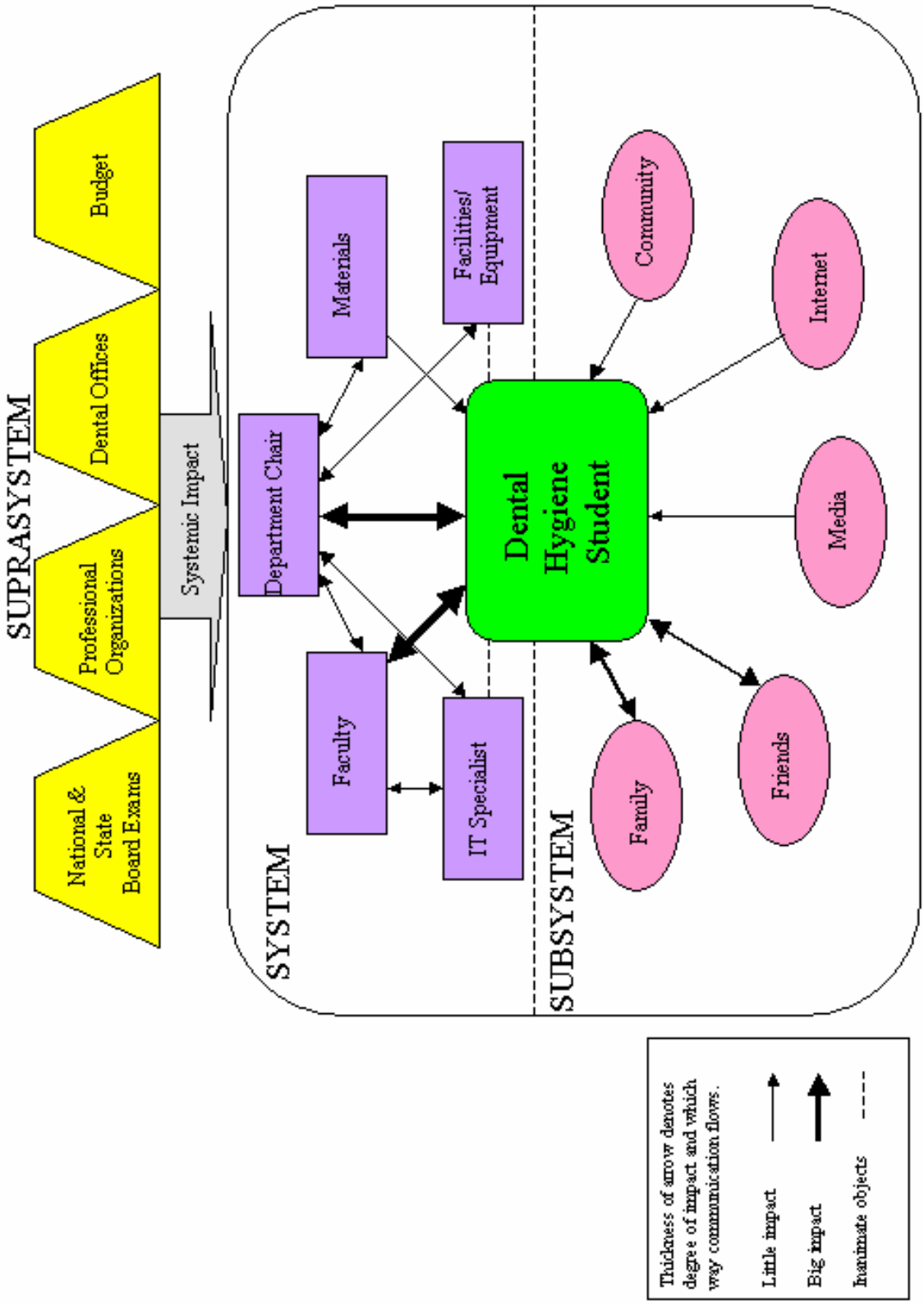

Figure 1. Systems Analysis Chart.

consisted of various components in the suprasystem level that greatly impacted the system in how they deliver pertinent information to the student.

The degree of influence each entity had on the other components in the system is indicated by a communication line. The communication line varies in thickness relative to the quantity of information passed. When direct communication or influence is exchanged between humans, an arrowhead indicates the direction of information being transferred. A communication line with two arrowheads at the end represents communication transfer in both directions. A communication line with a single arrowhead represents communication transfer in one direction. A dashed line indicates influences by inanimate objects or forces. To gain a better understanding of how the different entities affected, impacted, or influenced the dental hygiene students, each level of the systems analysis will be explained in detail.

Subsystem

The subsystem forces which are external to the dental hygiene student consisted of family, friends, media, the Internet and the community. These major groups greatly influenced the way the dental hygiene student learned, thought, acted or felt. In addition, these major factors influenced the decisions made regarding their oral health.

One of the most influential groups of people that impacted the dental hygiene students are their families. Family members have a very strong bi-directional communication pathway to the dental hygiene student, as indicated by the thick arrow in Figure 2. The experience and knowledge from the family members had a tremendous amount of influence on what the dental hygiene students knew and believed to be correct information. For example, if dental hygiene students learned about oral cancer examinations and how important it was to see a dentist to check for oral cancer, the dental hygiene students might tell family members what they learned.

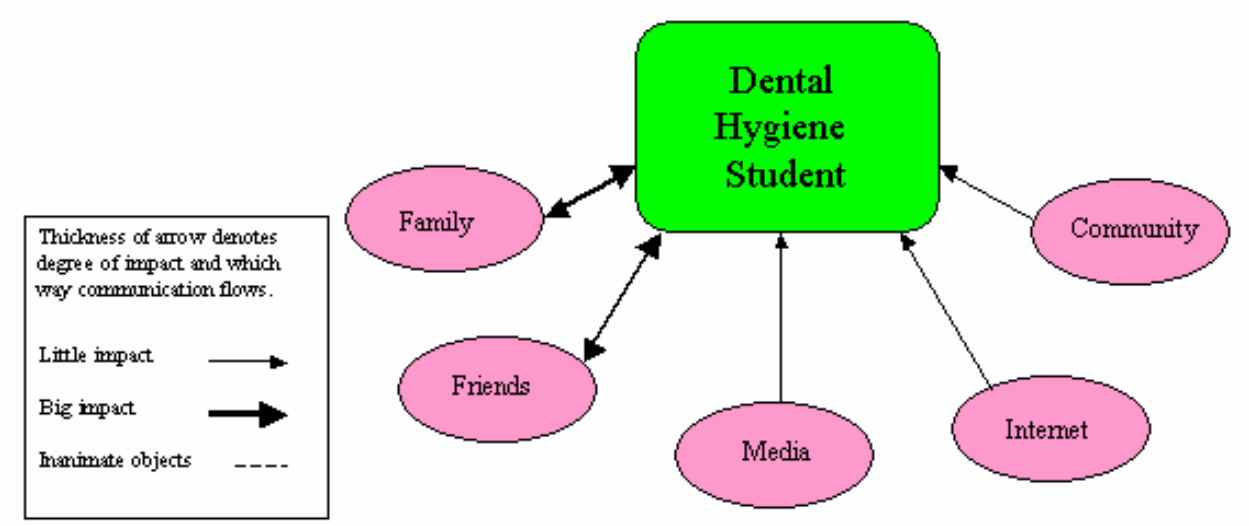

Figure 2. Subsystem Chart.

If a family member does not feel that this examination was important, he or she might not schedule an appointment with the dentist, especially if money was limited. On the other hand, a family member's past experience in the dental office may greatly influence the way the dental hygiene student values the seriousness of this debilitating and life threatening disease. For example, if a family member was diagnosed with possible oral cancer and was told of its treatment outcomes and risk factors associated with this disease, a dental hygiene student would be more aware and conscious of the risks of oral cancer. If that family member took the information seriously, he or she would greatly influence the need for promoting and conducting the oral cancer examination, and hence, increase the likelihood that the dental hygiene student would value oral cancer examination techniques.

Friends also greatly influenced the manner in which the dental hygiene student learned or valued oral health care. Similar to family members, friends had a strong bi-directional communication pathway, as indicated by the thick arrow in Figure 2. Friends were influential like family members, in giving advice and information. Friends can greatly influence the

students' perceptions and attitudes towards valuing oral health care needs and oral cancer examinations.

The media also had some influence on the dental hygiene student, as indicated by the thin unidirectional arrow as indicated in Figure 2. Media such as television, magazines, and radio ads had some influence on the way the dental hygiene students valued their oral health needs. For example, oral cancer ads increased on television, which informed the viewers of the need to get routine dental care and make sure the dentist or dental hygienist performs this non-invasive procedure. The idea behind these ads was to make the public aware that oral cancer is a serious problem just like breast or colon cancer. If the dental hygiene student valued what was being done to promote awareness of oral cancers, the likelihood of conducting a thorough oral cancer examination would increase.

With the increase of Internet users, the Internet has become a widely used avenue for individuals to gather health information. As indicated by a unidirectional arrow in Figure 2, the Internet provided the dental hygiene student with an abundance of information on topics, such as tooth whitening products, esthetic restorations, toothpastes, toothbrushes, periodontal disease, and oral cancers. With all the information gained from the Internet, the dental hygiene student had a greater database of knowledge. Armed with this type of information, the dental hygiene student could become an active participant in the decisions made regarding his or her oral health and the oral health needs of his or her patients, including the need for oral cancer examinations.

The community in which the dental hygiene students lived also influenced their beliefs and values regarding their oral health, as indicated by the thin unidirectional communication pathway arrow in Figure 2. Community health fairs are put on by local organizations that represent medical, dental, and other health professionals. Community health fairs have become a

resource for people to receive information, products, and services. Many of the health fairs have booths dedicated to perform certain services like eye examinations, oral cancer exams, and blood pressure readings. The community influences the dental hygiene students because it portrays a community which is trying to promote a healthier lifestyle. It also shows the dental hygiene students the important role they will be playing when they graduate.

As mentioned above, the subsystem factors all had some degree of influence on the dental hygiene students and how they impact the students' beliefs and that of their patients. Although the subsystem greatly affected the amount and type of information transferred, the dental hygiene students needed to learn the etiology, process, treatment, and outcomes from the system, which is depicted in Figure 3, in order to be considered successful in performing the oral cancer examinations.

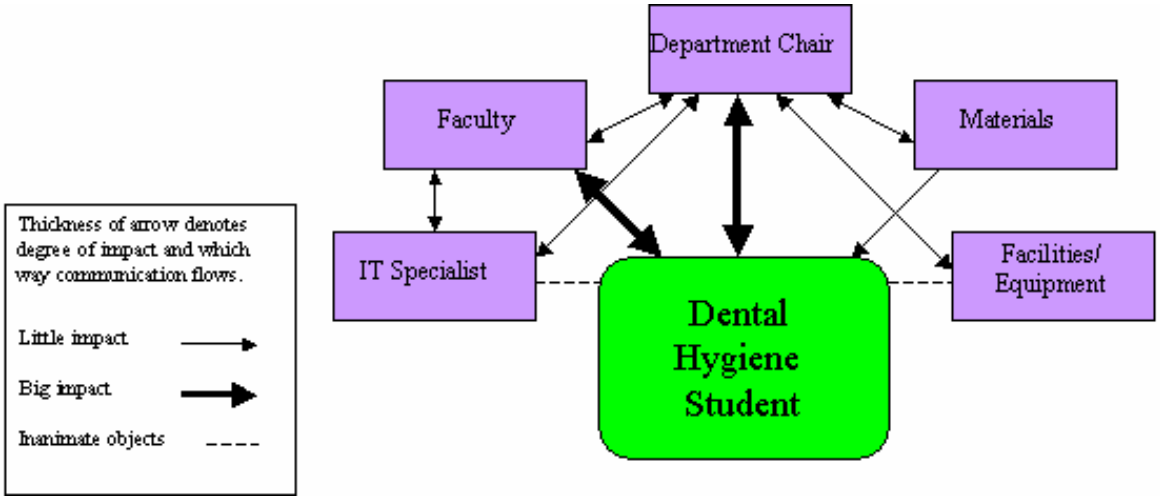

Figure 3. Systems Chart.

System

The system level was the environment where learning of the instructional material occurred. Figure 3 depicts the system level or the setting in which the dental hygiene students learned the information on oral cancer examination. The different entities that comprised the core of this group were the faculty, Department chair, IT Specialist, materials, and facilities/equipment.

The major influences on the dental hygiene students learning were the faculty. Faculty members had a very strong bi-directional communication pathway to the students, as seen in Figure 3. Basically, the faculty had the knowledge and skills that were to be passed on to the students. Students gained the information to better their own oral health care needs and pass it on to their patients, combining information learned from the subsystem factors.

In addition, the faculty had some type of communication between the IT Specialist and the Department chair. The faculty needed to communicate to the IT Specialist any concerns that may have hindered the delivery of information. Many times, faculty members utilized such mediums as television, Internet, and video sources to deliver information to the students. However, if something went wrong where the faculty could not access the Internet or start the video, it had an impact on the amount of information the students gained. If the students were visual learners, this could have greatly impacted the value they may have about oral cancers because they did not have substantial evidence to back up the lecture portion of the lesson.

The faculty also had the responsibility to communicate to the department chair as indicated by the thin communication bi-directional pathway arrow in Figure 3. Faculty needed to get approval to create or distribute certain information to the students. Information passed to the students needed to be correct and approved by the Department chair.

The Department chair was a major player in the system level. The Department chair had a lot of influence on everything that existed within the system level. The Department chair had a strong communication pathway to the students in regards to sending them out to other dental facilities in the state and making sure they passed exams, treated patients with respect, and valued their own oral health care needs. The Department chair also had to make sure that the materials and faculty/equipment were available to the students for learning. Many times, the various materials and faculty/equipment were not available due to the sharing of classrooms with different disciplines in the school. This made it difficult for the students to gain knowledge and skills through different sources.

Finally, the IT Specialist had an influence on the students, but did not physically interact with them. The IT Specialist provided the students with a computer lab to use the various equipment and software applications to learn material. Therefore, the communication pathway is depicted by dashed lines to indicate forces that indirectly influenced the learner.

Suprasystem

The suprasystem level was the level that affected the system level by mandating guidelines, procedures and skills allowable by law. The suprasytem level was composed of several entities that governed and regulated the practices of the dental hygiene department. These entities consisted of the National and State Board Exams, Professional Organizations, and Dental Offices. The Department's financial resources or Budget also systemically impacted the system, as seen in Figure 4.

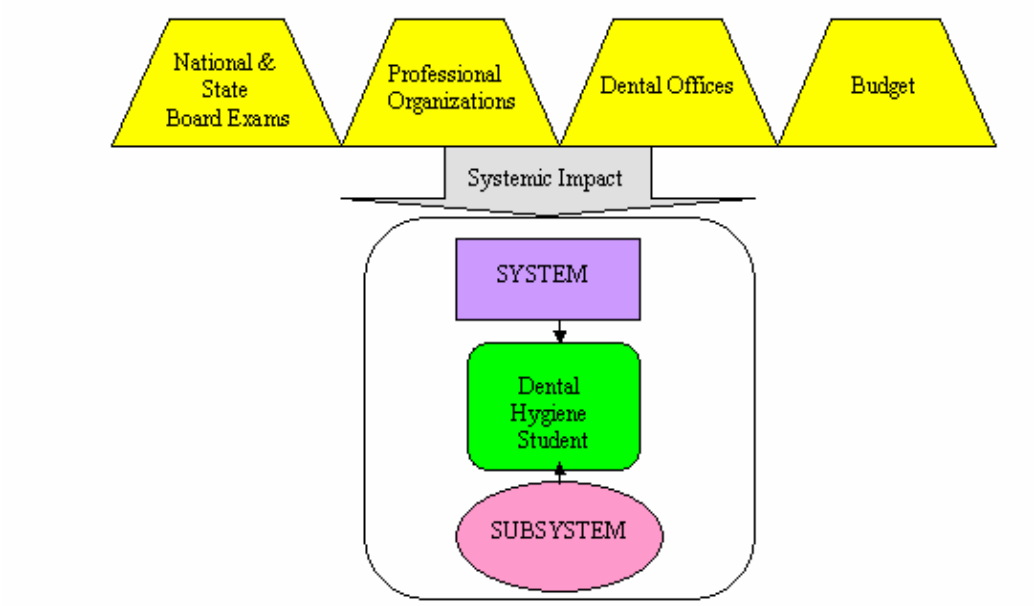

Figure 4. Suprasystem Chart.

The National and State Board Exam had a great influence on the dental hygiene students. The National Board Exam was an exam given to all dental hygiene students graduating from college. This exam tested the cognitive knowledge of the students. If the students were cognizant of oral cancer examination, they would be confident in educating the patients about oral cancers, ultimately valuing the information for personal oral health care. Therefore, if students successfully passed the National Board Exam, they could apply to take the State Board Exam.

On the other hand, the State Board Exam was a psychomotor skills exam. The State Board Exam validated if the students could perform all the different procedures, at a minimum competency, as permissible by the State. With the psychomotor skills to perform the head, neck, and mouth examination, the dental hygiene student should have been able to perform and value the need to conduct this routine examination at every hygiene appointment or as needed during a continued sequence of treatments.

If the dental hygiene students passed both exams successfully, they would become licensed dental hygienists. Once they became licensed dental hygienists, they needed to keep up with current dental and medical health issues that may affect their oral health care needs and that of their patients.

In addition to the National and State Board Exams, the Professional Organizations had a strong influence on the system level. The Professional Organizations provided the dental hygiene students with current issues, products, equipment, and research. Armed with all the knowledge, the students would be able to promote and educate their patients to be aware and value the need to seek routine dental care and receive oral cancer examinations. The main organization for the dental hygiene students was the local Dental Hygiene Association (DHA). The other organization that influenced the dental hygiene students was the local Dental Association (DA). The local DHA and DA impact the dental hygiene department in a thick unilateral communication pathway.

The dental offices also influenced the system by recruiting qualified dental hygiene students to practice in their offices. The dental offices had a strong influence because they communicated to the school on whether or not the student performed all duties related to the oral health care needs of the patient. The dental office also provided further development of the necessary knowledge and skills needed for the students to educate themselves and their patients on valuing their oral health care needs and oral cancer examinations.

Finally, a major component of the suprasystem was the budget. The budget greatly influenced the amount of materials to be bought, the type of equipment to be used, and the type of mediums to be used to deliver information to the students. The different mediums had an impact on the system and how it affected the students' learning. For example, viewing a paper-

based tutorial on how to conduct the oral cancer examination may not have been valued as much as giving the students an interactive multimedia instructional module to view. The module may have provided better examples, in a three-dimensional view, of the process of conducting an oral cancer examination than reading how to do it.

In conclusion, the dental hygiene students were affected or impacted in some way by the various entities that comprised the subsystem, system, and suprasystem levels. Each entity provided the students with knowledge and skills to value and practice as dental hygienist. Therefore, armed with the knowledge and skills, the dental hygiene students should conduct and promote the awareness of routine oral cancer examinations.

Objectives

The oral cancer examination is a vital component in the overall assessment of the dental patient. Many dental hygiene students lack the knowledge and psychomotor skills to perform this critical, yet painless procedure. This causes many students to skip certain procedures, perform the procedure in an unorganized fashion, feel less confident in conducting the examination, and not know how and why to educate their patients about oral cancers.

A need existed to provide students with the knowledge and psychomotor skills to allow them to perform the head, neck, and mouth examination, on a routine basis, to detect early signs of oral cancer. The knowledge and psychomotor skills learned will lead to a decrease in skipping procedures, increase in performing the examination in a systematic and organized fashion, increase in confidence in conducting the examination, and increase in knowing how and why dental hygiene students should educate their patients about oral cancers.

To account for this need, an interactive multimedia instructional module for first-year dental hygiene students was created to provide the students with information needed to perform

the oral cancer examination. The instructional hierarchy chart in Figures 5 and 6 was created to reflect the skills and sub-skills needed to perform the terminal objective. The terminal objective of this module was to conduct a thorough oral cancer examination and determine if the proper techniques were utilized.

The first cluster of objectives dealt with the extraoral and intraoral components needed to lay the foundation for the terminal objective to occur. The objective for this cluster would be for the students to have entry level knowledge on what is a face, a head, a neck and the lips, as seen in Figure 6. Once the students could distinguish these, they could build upon that knowledge to define lymph nodes, temporal mandibular joint (TMJ), mucosa, gingival, palate, pharynx/tonsils, and the floor of the mouth. This would lead the students to determine the components in the extraoral and intraoral examination, ultimately leading them to the terminal objective. Figure 7 lists the objectives for the first cluster.

The second cluster of objectives dealt with the different types of palpation techniques utilized to conduct the head, neck and mouth examination, as seen in Figure 8. In this cluster, there are no entry level behaviors. The students were asked to define *palpation*, which would then lead to defining *digital*, *bi-digital*, *bi-lateral,* and *bi-manual* palpation techniques. This, in combination with the first cluster of objectives, would provide the students with the necessary knowledge and psychomotor skills to conduct the head, neck, and mouth examination.

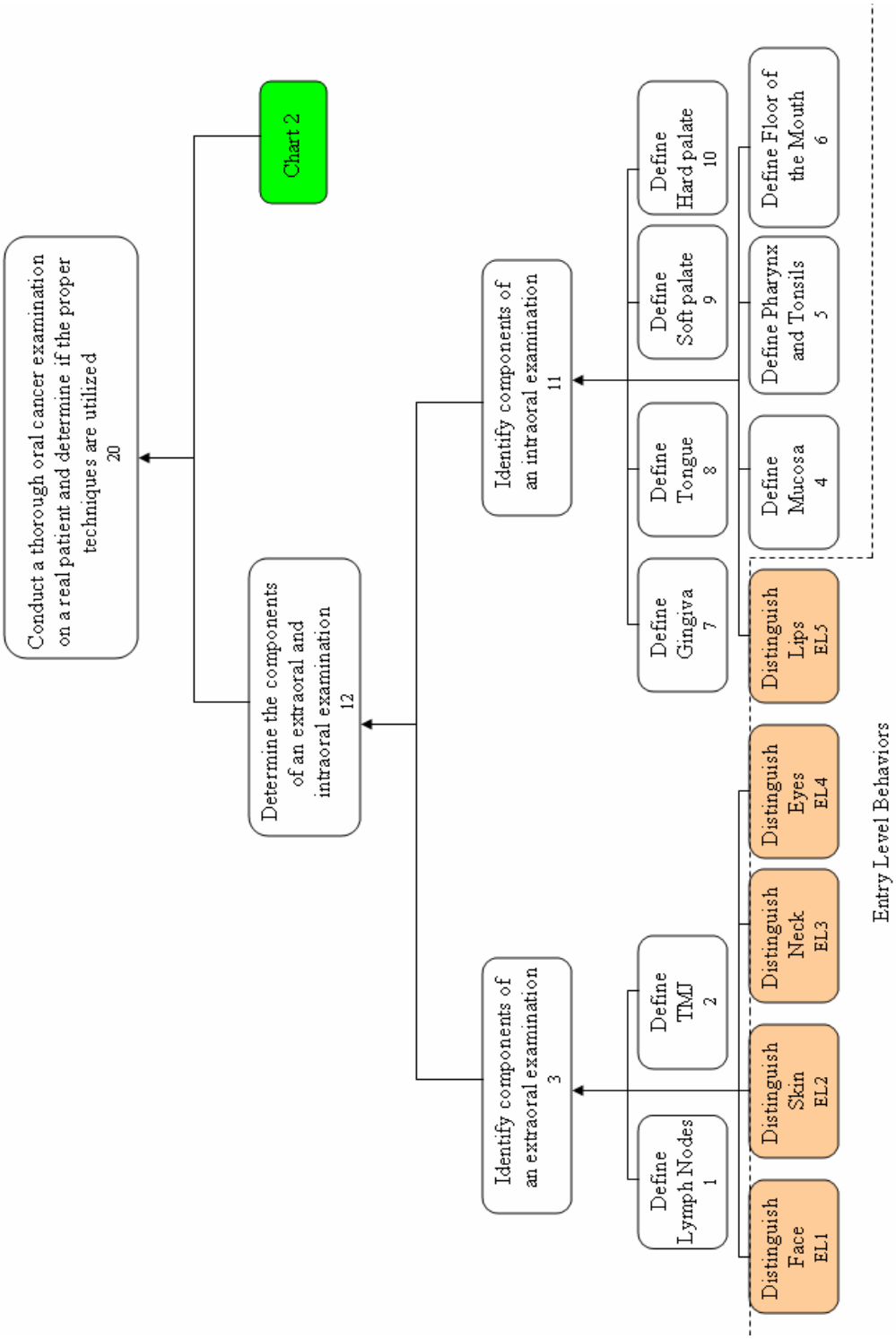

Figure 5. Instructional Hierarchy Chart.

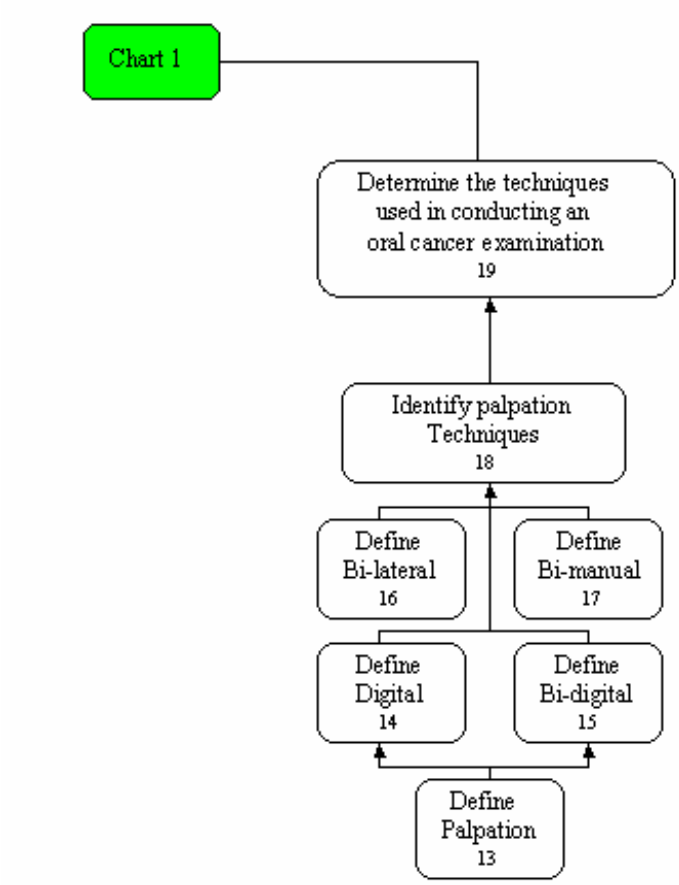

Figure 5. Instructional Hierarchy Chart (continued).

The terminal objective, seen in Figure 9, is the desired goal that the students must attain from viewing the instructional module. The objective of this cluster was to determine if the students can perform a thorough and systematic head, neck and mouth examination.

Entry Level Objectives

Objective #	Behavior	Objective
EL1	Distinguish Face	Given four pictures, the student will distinguish the face
EL2	Distinguish Head	Given four pictures, the student will distinguish the head
EL3	Distinguish Neck	Given four pictures, the student will distinguish the neck
EL4	Distinguish Lips	Given four pictures, the student will distinguish the lips

Figure 6. Entry Level Objectives.

Cluster 1: Extraoral and Intraoral Components

Objective #	Behavior	Objective
1	Define Lymph Nodes	Given four definitions, the student will choose the correct statement that defines lymph nodes
2	Define TMJ	Given four definitions, the student will choose the correct statement that defines TMJ
3	Identify components of the extraoral examination	The student will list the various components that make up the extraoral examination
4	Define Vestibule	Given four definitions, the student will choose the correct statement that defines vestibule
5	Define Pharynx/ Tonsils	Given four definitions, the student will choose the correct statement that defines pharynx/tonsils
6	Define the Floor of the Mouth	Given four definitions, the student will choose the correct statement that defines the floor of the mouth
7	Define Mucosa	Given four definitions, the student will choose the correct statement that defines mucosa
8	Define Gingiva	Given four definitions, the student will choose the correct statement that defines gingiva
9	Define Palate	Given four definitions, the student will choose the correct statement that defines gingiva
10	Identify the components of the intraoral examination	The students will list the various components that make up the intraoral examination
11	Determine the components in conducting an extraoral and intraoral examination	The students will list the components of the extraoral and intraoral examination

Figure 7. Extraoral and Intraoral Components.

Cluster 2. Palpation Techniques

Objective #	Behavior	Objective
12	Define palpation	Given four definitions, the student will choose the correct statement that defines palpation
13	Define digital	Given four definitions, the student will choose the correct statement that defines digital
14	Define bi-digital	Given four definitions, the student will choose the correct statement that defines bi-digital
15	Define bi-lateral	Given four definitions, the student will choose the correct statement that defines bi-lateral
16	Define bi-manual	Given four definitions, the student will choose the correct statement that defines bi-manual
17	Identify palpation techniques	Given short video clips to view, the student will choose the correct palpation technique
18	Determine the techniques used in conducting an oral cancer examination	Given a video clip to view, the student will list the different techniques used to conduct an oral cancer examination

Figure 8. Palpation Techniques.

Cluster 3: Terminal Objective

Objective #	Behavior	Objective
19	Conduct a thorough oral cancer examination and determine if the proper techniques are utilized	Given a real patient, the student will perform a thorough oral cancer examination

Figure 9. Terminal Objective.

Design of the Instructional Module

Systems Approach Model

The interactive multimedia instructional module was created using the Dick and Carey Systems Approach Instructional Model (Dick, Carey, & Carey, 2001). The Systems Approach Model helped the instructional designer to create an interactive multimedia instructional module on the techniques of conducting the head, neck, and mouth examination. This model was utilized as the basic foundation and guide to assist the instructional designer with checkpoints to ensure that the design phase had gone through a rigorous process in creating an effective and

efficient learning tool. The Dick and Carey Systems Approach Model included ten significant stages. The ten stages are (1) instructional goal, (2) instructional analysis, (3) entry behaviors and learner characteristics, (4) performance objectives, (5) criterion-referenced test items, (6) instructional strategy, (7) instructional materials, (8) formative evaluation, (9) summative evaluation, and (10) revise instruction. A global discussion of each stage follows.

Stage 1: Instructional Goal was defined as attaining a desirable outcome. The role of an instructional designer was to determine instructional goals from non-instructional goals. Once the goals had been identified, the instructional designer proceeded to do a needs analysis that identified the discrepancy or gap that existed between the "what is" and the "what should be." Furthermore, to achieve a desirable state of affairs, the major stakeholders should be involved in the development of the instructional goals. One major stakeholder was the content experts who were knowledgeable about oral cancers and the techniques involved in conducting the oral cancer examination. With all the major players involved in the decision making process, realistic goals could be achieved.

Stage 2: Instructional Analysis was the component that determined the skills needed to reach the desired goal. To achieve this type of goal, a task analysis or procedural analysis was done. Once the task analysis was done, the instructional designer could list a detailed summary of the skills needed to perform the goal. Furthermore, a task classification could be used to identify the learning outcome. These included the verbal information, attitudes and intellectual skills that would be applied to different people with different learning styles. In addition, an information-processing analysis could be done to ascertain the intellectual skills involved in solving a problem. This process was best suited if the learner verbally talked through a problem, thereby giving the instructional designer an idea of how the learner was thinking and applying

his or her knowledge and skills in solving a problem. The instructional designer could then determine where the learner would need additional help. Another instructional analysis included the learning-task analysis, which dealt with the objectives of the intellectual skills. The main goal was to reveal the objectives that would help in the decision making process.

Stage 3: Entry Behaviors and Learner Characteristics. At this stage, the instructional designer needed to know what types of knowledge and skills the learners possessed. Once the instructional designer acknowledged the different learner characteristics, only then could they design an instruction that would meet the needs of all the learners. The instructional designer needed to know what types of information would be delivered to the learners and what type of learners would need additional information or help. In addition, the abilities and traits of the learners played a major role in the learning outcome and the instructional designer should account for these specific characteristics that may have affected the way a learner learns.

Stage 4: Performance Objectives were specific activities that determined if the learner was reaching the intended goal. In addition, the performance objectives focused the lesson plan to the different conditions of learning as determined by the entry behavior and learner characteristics stage. The purpose was to guide the instruction to the desired goal. Therefore, stating the performance objectives first would help to guide and develop a lesson plan suitable for the intended audience.

Stage 5: The purpose of testing the learners was to determine what skills, knowledge or attitudes the learner lacked. Once the learners' weaknesses were identified, the instructor could provide immediate feedback and direct the instruction in a different way. In addition, testing was done to evaluate the progress of the students throughout the year, but more importantly to evaluate the progress of the instructional system.

Stage 6: Instructional Strategy means a plan to help the learners achieve their performance objectives. The instructional strategy that was developed by Gagné, consisted of nine events of instruction that lead the learner down a guided pathway to perform the desired objective (see Appendix A for Instructional Strategy). If the desired objectives were not met, the instructor revised and improved upon the instruction or the instructional material and provided immediate feedback during the different events of instruction.

Stage 7: Instructional Materials referred to printed, video, or audio products that helped to enhance the instructional setting. The instructional material should not be used solely as the driving force in the instruction of a lesson. It should be used as an adjunct to reinforce what has been said. The production of materials could be costly; therefore, it was useful to find materials that already existed. Teachers needed to be aware that using instructional materials should have a direct benefit to the students and not be used simply because they were available.

Stage 8: Formative Evaluation consisted of three detailed levels in the process of determining the need to revise and improve instructional materials. The different levels helped the instructional designer at specific stages of the development of the instructional material that was delivered to the target audience. The main goal was to design the instructional materials that would be effective and efficient for a large number of people.

The first level took one person from a target audience and provided them with one-on-one instruction with the instructional material. This level gave the instructional designer information on how to structure and correct problems right at that moment. It also provided the instructional designer with possible situations that were likely to occur in a bigger sample of the target audience.

Once the first level had been improved, the next step was to take a small sample from the target audience. The sample group would test the instructional module to determine if there were any further revisions deemed necessary. Therefore, the main purpose of this level was to get a better idea of how effective the instructional material would be when utilized in a larger group.

Lastly, once the instructional materials had been through a rigorous process of revision on the basis of one-on-one instruction and a sample group, the instructional material was now ready to be released to the target audience. In essence, once one had reached this stage, the process was supposed to identify most of the problems that could be resolved to improve the instructional material and, therefore, the outcome of the learner using the instructional material.

Stage 9: Summative Evaluation is usually conducted after the instructional material has gone through the formative evaluation. The purpose was to see how effective the instructional material was after the changes were suggested by the *small* group. Once the materials or products had gone through scrutinizing reviews, the materials or products could be disseminated to other sites. The material or product can only be deemed effective if it was valid and reliable and impacted a large number of people. In some cases, if the material or product was very effective in impacting a large number of people, it could qualify for grants or funds to support dissemination into the other sites. Due to time constraints, the summative evaluation was not done for this project.

Stage 10: Revise Instruction occurred at all stages of the Dick and Carey model. The purpose was to update or improve on the different stages before one reached the end. This way, the instructional designer could produce an effective and efficient material to be introduced to the target audience. Revising at each checkpoint ensured that all the problems and flaws had been addressed to build a better foundation for the next stage to occur.

Description of the Module

Based on the detailed description of the Dick and Carey Model framework, the instructional designer directed the design process to develop an interactive, multimedia, Web-based instructional module on oral cancer examinations techniques.

Multimedia-based

The interactive instructional module was created using Macromedia Flash MX because of its ability to easily incorporate video clips into the module. In addition, it allowed the instructional designer to create an exciting and motivating instructional module using graphics, animation, and texts and to incorporate an interactive component into the module. The interactive component allowed the dental hygiene students to get immediate feedback from the module before being allowed to perform the head, neck, and mouth examination on a real patient.

Web-based

A Web-based interactive instructional module was used to give the students an alternative to paper-based modules. The Web-based instructional module was hosted on the Educational Technology Department's server which allowed only enrolled dental hygiene students to access the information from school or home. Access to this Web-based instructional module was limited to only the first-year dental hygiene students who needed to login using their user identification and password. Once the instructional module was tested and revisions made, the instructional module was opened up to all dental hygiene students, faculty and staff in the Department.

Topics

The interactive multimedia instructional module covered basic fundamental topics on oral cancer examinations. The topics covered a section on the basic terminology and vocabulary words needed to be able to assess and conduct the oral cancer examination and the main section on the process and techniques used to conduct the oral cancer examination.

Participants

Audience

The target populations for this interactive multimedia instructional module included dental, dental hygiene, medical, and nursing schools in the United States. Oral cancer examination is a procedure that these disciplines are trained to perform. However, a majority of oral cancer examinations are performed by dentists and dental hygienists; therefore, they were chosen as one of the main target populations. The intended target population was a mixture of the varied disciplines that are of different ethnic, social, and economic backgrounds. The target population also varied in ages and gender, but they must have been able to read and write at the college level and possess some basic knowledge and skills with using a computer.

The target population should have had basic knowledge of the human body. For example, at a minimum, users of the module should have taken a course in Human Physiology and Anatomy. Each discipline varies in the number of prerequisites required to enter its program, but Human Physiology and Anatomy gives the target population some basic knowledge about the human body.

Furthermore, this interactive module targeted students who had not conducted an oral cancer examination. This enabled the instructional designer to get a better assessment on

whether or not the student had fully transferred cognitive knowledge from the interactive multimedia module to performing the psychomotor skill examination.

Sample Population

The sample population was comprised of 22 first-year dental hygiene students in a public institution of higher learning in the Pacific Rim. The sample population consisted of sophomores, juniors, and seniors. The first-year dental hygiene students, during the 2005-2006 school year, were asked to participate in testing the module to see if they could retain and transfer cognitive knowledge learned from the module to performing an oral cancer examination competently and thoroughly.

In addition, the sample populations had taken courses in Human Physiology and Anatomy, were able to read and write at the college level and had some experience using computers.

Content Experts

Before the instructional module was created, the instructional designer asked two individuals to be the content experts. The content experts aided the instructional designer in developing content, structure, clarity, techniques, and psychomotor skills that were presented in the instructional module. The two content experts were from the same dental hygiene department from which the sample population was chosen. The content experts also aided the instructional designer in developing cognitive test questions and a checklist that was utilized during the psychomotor skills examination.

The first content expert the instructional designer spoke with was an assistant professor in the Dental Hygiene Program at a local university. This assistant professor taught General and Oral Pathology I and II, and had been teaching for 20 years. In addition, this assistant professor

was also a licensed practicing dentist in the private sector. This content expert was chosen due to her qualifications and knowledge of the subject matter. This content expert assisted the instructional designer in writing content for the instructional module and selecting pictures that were used to provide visual stimulus.

The other content expert was an instructor in the dental hygiene program. She was also the department chairperson, and had been teaching for 25 years. She currently taught the oral cancer examination course. This course focused on basic oral cancer examination terminology, techniques, and the systematic process of performing the oral cancer examination. This content expert assisted the instructional designer in checking to see if the techniques and process were correct during the video taping portion. In addition, this content expert aided the instructional designer in developing cognitive test questions and a checklist for the performance of the oral cancer examination.

Technical Experts

In addition to the two content experts, the instructional designer recruited a Web designer, an Instructional Technology Specialist (IT Specialist) in the Educational Technology department, a WebCT expert, and a technical support assistant who assisted the instructional designer in designing the overall template of the instructional module and providing technical assistance as needed.

The instructional designer recruited several Web designers who had a combined experience of about 15 years. The Web designers assisted the instructional designer in creating the instructional module in Macromedia Flash MX.

The IT Specialist in the Educational Technology department also assisted the researcher in housing the instructional module on the school's Web site.

Finally, the instructional designer recruited a technical support assistant who helped set up and breakdown the video equipment. The technical support assistant was actually a video expert who had been shooting videos for the past four years. His expertise was utilized regarding the best angle or shot to film, placement of the lights, and facilitating the entire video process.

Because the instructional designer lacked the technical skills in creating the instructional module, the instructional designer needed assistance from these experts.

Actors

Once the content experts were interviewed, the instructional designer recruited actors to be filmed during the video portion of the instructional module. There were two actors who volunteered to be in the video.

One actor, an instructor in the dental hygiene program, was the dental health professional who demonstrated examples of the different palpation techniques, the different anatomy structures, and the systematic process of conducting the oral cancer examination on the patient. The second actor, a second-year dental hygiene student in the dental hygiene program, was the patient on whom the dental health professional conducted the oral cancer examination. These two actors were an important component in the creation of the instructional module.

Committee for the Protection of Human Subjects

The interactive multimedia instructional module utilized dental hygiene faculty in the video as actors and demonstrators. In addition, students performed the oral cancer examination procedures on a live person to assess whether or not they could learn a psychomotor skill from an interactive multimedia instructional module. Therefore, before any creation of the module, the instructional designer received approval for human subject testing. The application for

Human Subject Testing was approved by the Committee for the Protection of Human Subjects (see Appendix B for Human Subjects Application and Approval form).

In the middle of July 2005, the instructional designer filled out the expedited forms to obtain approval to use human subjects in the video that was incorporated into the interactive multimedia instructional module. In addition, the instructional designer obtained approval to include human subjects to sit as patients for the dental hygiene students to perform the oral cancer examination. Furthermore, the instructional designer also filled out the required informed consent forms to ensure that the actors, demonstrators, students, and patients had been informed of their rights and confidentiality.

Formative Evaluation

One-on-One-Content Experts

The two content experts were interviewed in a one-on-one semi-structured session, in an informal setting. The semi-structured interview allowed the content expert and the instructional designer to freely ask questions pertaining to the development of the module and to assess what goals and objectives the dental hygiene students would need to accomplish in the oral cancer examination.

One-on-One Technical Experts

The technical experts all participated in one-on-one semi-structured interviews, in an informal setting. The semi-structured interviews allowed the instructional designer to ask questions pertaining to the development of the instructional module. Some of the questions the researcher asked were: 1) what platform would be applicable for the development of an interactive multimedia instructional module containing short video clips?, 2) what method would be best to view the module?, and 3) and how do I shoot a video?

One-on-One Actors

The actors were recruited in an informal setting at the dental hygiene department's monthly meeting in May of 2005. A non-structured interview was conducted. The instructional designer basically asked for anyone who would like to participate as actors in the production of the video. Two dental hygiene faculty members volunteered to help the instructional designer in the video production phase.

One-on-One Target Population

The instructional designer performed two one-on-one sessions with individuals from the target population to gain immediate feedback about the module in order to make any necessary revisions before presenting it to the small group. The one-on-one sessions were conducted in the same controlled environment where the small group tested the module. This eliminated potential problems in using different computers.

Prior to viewing the instructional module, the students were given the informed consent, the demographic survey, the pre-test multiple-choice test questions and the pre-test psychomotor skills assessment. Once the demographic surveys were completed, the instructional designer explained the content in the instructional module. The students were required to complete the entire module and answer the test questions at the end. Once done, the students were taken to a clinical environment to conduct the oral cancer examination as part of the psychomotor skills assessment. The instructional designer obtained permission to utilize the clinical chairs in the dental hygiene department to conduct the psychomotor skills assessment. The psychomotor skills assessment utilized a checklist for the instructional designer to identify if the students conducted all the appropriate tasks. The clinic provided the instructional designer with available chairs that were equipped with a saliva ejector, air/water syringe tip, cuspidor, bracket table and

dental light. This essential equipment provided the students with a real-world experience in the set up and utilization of the dental chair. In addition, the instructional designer provided all necessary personal protection equipment such as disposable gowns, bonnets, gloves, mask, mirror, and sterile gauze. After the psychomotor skills assessment, the instructional designer gave the students an attitudinal survey. When the students completed the attitudinal survey, the instructional designer conducted a one-on-one interview to gain immediate feedback about the module. This allowed the instructional designer to gain an in-depth look into what revisions or modifications were needed to be addressed prior to testing the module on the small group.

Small Group

After the revisions were made from the one-on-one sessions, the instructional designer tested the module on the *small* group. The exact same format was utilized to test the *small* group. An informed consent was filled out at the beginning, then a demographic survey was given, a pre-test and post-test were given before and after viewing of the instructional module, an attitudinal survey was given after the post-test and a structured interview was conducted after the attitudinal survey.

Tasks of the Instructional Designer

The instructional designer had many tasks to accomplish in order to succeed in the creation, implementation, and testing of the instructional module. Before the conception of this module, the instructional designer needed an area of inquiry. The instructional designer analyzed situations in the instructional environment to see if an alternative way of delivering instruction could enhance the transfer and retention of information versus using traditional methods of delivering instruction. One such topic that arose was oral cancer examination. Many of the students had difficulty in transferring what was learned in the classroom to a clinical

setting. Based on this observation and the search of the literature, the instructional designer decided to create an interactive multimedia instructional module on oral cancer examination. A timeline was created to keep the instructional designer focused on the deadlines set for each major step of the project (see Appendix C for Timeline).

First, the instructional designer needed to write an idea paper on the topic and present the proposal to a committee for approval. Once the committee approved the research topic, an advisor was selected to guide the instructional designer through the research project. The advisor suggested that the instructional designer work on writing the first 3 Chapters, of the proposal, as thoroughly as possible; apply for the human subjects test once the proposal was formally accepted; and set deadlines for when certain tasks should be done. The advisor also suggested that the instructional designer plan on submitting the entire paper at least two to three weeks before the deadline, to allow time for refinement.

Second, the instructional designer needed to present a completed proposal to the advisor on the first day of instruction. To help with this portion of the tasks, the instructional designer took a course that focused on writing the proposal. The three chapters of the proposal included 1) introduction of the topic, 2) literature review, and 3) methodology. The introduction section was where the instructional designer discussed why the topic was of importance to the instructional designer and described the need to create an interactive multimedia instructional module for the dental hygiene students. The literature review section was a culmination of all the research findings the instructional designer researched in order to determine the history, relevance and related studies of the topic that incorporated a similar type of instructional module. The methodology section was where the instructional designer gave (a) a detailed explanation of what the goals and objectives of the project would be, (b) analyzed the system on how each

factor affected each other and the interactions between the systems, (c) described the target and sample population, (d) described how the module was designed, (e) detailed how data would be collected and analyzed, (f) identified who the content experts would be, (g) cited the limitations and assumptions of the project, (h) specified the tasks of the instructional designer and participant, (i) created a timeline, and (j) described plans for data analysis. After completing the required chapters of the paper, the instructional designer turned in the proposal to the advisor for comments and recommendations. Once the advisor returned the proposal back to the instructional designer with comments, the instructional designer revised the paper and submitted it for full approval.

Third, the instructional designer needed to secure approvals from the Department Chairperson where the sample population would be tested. The approvals were to test the first-year dental hygiene students and to use the clinical setting to conduct the psychomotor skills assessment. In addition, the instructional designer needed to obtain approvals from the Committee on the Protection of Human Subjects, obtain approval from the IT Specialist to house the module on the school's Web site and obtain approvals from the actors in the video.

Fourth, the instructional designer needed to create the instructional module to test with the dental hygiene students. In addition, the instructional designer needed to write and distribute the demographic survey, attitudinal survey, the pre- and post-test questions, and the checklist for the psychomotor skills assessment.

Tasks of the Participant

There were several key participants in this project. First, the content experts assisted the instructional designer and technical experts in the development and revision process of the

instructional module. This process ensured that content was presented as accurately as possible and to see if method of delivery was effective.

Next, the two dental hygiene students from the target population went through the module and conducted the oral cancer examination to see if any revisions to content, graphics, structure, sequence, and clarity were deemed necessary. If any revisions were indicated, the instructional designer corrected the changes prior to administering the instructional module to the *small* group.

Finally, the *small* group filled out the informed consent form (see Appendix D for Informed consent forms), demographic survey, answered the pre-test multiple-choice questions, performed the pre-test psychomotor skills assessment, viewed the instructional module, answered the post-test multiple-choice questions, and performed the post-test psychomotor skills assessment. Furthermore, the *small* group filled out an attitudinal survey and sat with the instructional designer for a one-on-one interview session to discuss the module.

Data Collection Methods and Instruments

Demographic Survey

The demographic survey was developed to identify students who had any type of prior knowledge on oral cancer examinations and if they had any experience in Web-based instruction prior to participating in this study (see Appendix E for Demographic survey). The students were asked for their ages, gender, ethnicity, first language, use of computers, experience accessing to the Internet, experience watching videos on a computer, and extent of prior knowledge regarding oral cancer examinations. The information from the demographic survey was analyzed and compared to identify characteristics that may have affected the learners' ability to accomplish or not accomplish the oral cancer examination.

The demographic survey was also compared with the psychomotor pre- and post-test scores to determine if students who had existing prior knowledge or experience scored higher than students who did not have prior knowledge or experience. In addition, the demographic survey was analyzed with the cognitive pre- and post-test scores to determine if students with prior knowledge or experience scored higher than students who did not have any prior knowledge or experience.

Oral Cancer Examination Checklist

The oral cancer examination checklist was developed to assess the psychomotor skills of the first-year dental hygiene students on performing the oral cancer examination (see Appendix F for Oral cancer examination checklist). Specifically, the checklist provided a systematic and logical way of conducting the oral cancer examination that the students could follow. More importantly, the checklist was utilized as an assessment tool for the instructional designer to grade the success of the students' ability to perform the oral cancer examination.

The checklist was divided into five major sections: (1) supplies and preparation, (2) patient preparation and comfort, (3) safety, (4) extraoral and intraoral examination, and (5) patient instructions. Each section was assigned a certain point value and assigned a certain deduction point per error. The total achievable point value and error point were as follows: (1) supplies and preparation was assigned 10 points, minus 2 points per error; (2) patient preparation and comfort was assigned 10 points, minus 5 points per error; (3) safety was assigned 10 points, minus 5 points per error; (4) extraoral and intraoral examination was assigned 65 points, minus 5 points per error; and (5) patient instructions was assigned 5 points, minus 5 points per error. The students were required to pass successfully at a minimum competency of 75%.

The oral cancer examination assessment checklist was utilized to compare the pre-test and post-test scores to determine if the interactive multimedia instructional module was effective in teaching the first-year dental hygiene students to perform the oral cancer examination appropriately.

Multiple-Choice Questions

The students were given a multiple-choice examination, consisting of 21 questions, following the viewing of the instructional module (see Appendix G for Multiple-choice questions). The multiple-choice questions asked the students to identify: (1) palpation techniques, (2) extraoral landmarks, (3) intraoral landmarks, (4) correct definitions, and (5) identify the correct process of conducting the oral cancer examination. The multiple-choice question examination was based on a percentage of the total score earned divided by 21 questions. The students were required to pass successfully at a minimum competency of 75%.

The data collected were analyzed to compare the cognitive and psychomotor results. The ratio of the number of students who passed or failed out of the total number of participants was utilized to compare the two domains of learning.

Interview Questions

The interview questions (see Appendix H for Interview questions) were conducted in a side room next to the dental hygiene clinic after the completion of the oral cancer examination and the multiple-choice test questions. The interview questions were based on the effectiveness of the interactive multimedia instructional module. The students were asked what aspects of the instructional module they liked best or least, specifically on interactivity, video component, sequence of content, test questions and other. The final question asked how the instructional module could be improved.

Attitudinal Survey

The Likert-type attitudinal survey (see Appendix I for Attitudinal survey) was administered following the interview questions. The attitudinal survey was broken down into three major areas concerning the interactive multimedia instructional module: (1) instructions, (2) content and layout, and (3) attitudinal. The students were asked to check off the column that represented their attitudes regarding the effectiveness of the instructional module. Each question was assigned five possible answers: (1) strongly agree, (2) agree, (3) undecided, (4) disagree, and (5) strongly disagree. The attitudinal survey was used as another tool in measuring the effectiveness of the module. The attitudinal survey also served to compare with the students' pre- and post-test psychomotor skills and cognitive knowledge.

The demographic survey, the pre- and post-test psychomotor skills assessment checklist, the pre- and post-test multiple-choice questions, the attitudinal survey, and interview questions were coded and linked to compare and analyze the results.

Limitations and Assumptions

There were some limitations to the instructional module. The module only helped students to cognitively understand the basic palpation techniques and process used to conduct the oral cancer examination. The module did not go into detail on how to identify and describe a lesion. It only gave the basic descriptors and terminology used in the conducting the oral cancer examination. The module also showed the techniques utilized by the Dental Hygiene Department which may not be the same techniques utilized in other schools.

In addition, the module was better accessed using a high-speed connection. Therefore, a dial-up connection was not recommended. This was in case a student wanted to access the module from home after the testing was done.

It was assumed that the participants had some basic knowledge on how to use a computer. It was also assumed that the participants had some skills in accessing and navigating a Web site. It was also assumed that the participants could read and write at the college level.

CHAPTER IV

DATA ANALYSIS

The instructional designer conducted a formative evaluation with two content experts and one one-on-one subject. The instructional designer gathered information from the content experts and one-on-one subjects to help revise the instructional module before testing the *small* group.

Content Expert Data

The instructional designer conducted two sessions with each content expert. The first content expert focused on the content and sequence of the module. The content expert suggested that the instructional designer follow the Department's form to provide the students with the same sequence as they would be utilizing in the clinic. The content for the module was sufficient enough for the students to understand, therefore, no revisions were made to that portion of the module. The second content expert noted that there was one missing technique from the module under the extraoral examination procedure. The instructional designer made the revisions before presenting the module to the small group.

One-on-One Data

Due to time constraints, the instructional designer tested the module with one one-on-one subject. This subject accessed the module from her home using her own computer. She was also a former graduate of the dental hygiene program. She had a high-speed connection and said she was able to view all the videos and pictures with no problem. She said it took about 45-50 minutes to view the entire module.

The subject liked the videos and how each individual clip showed the different examination sites. She also liked that the videos showed the detailed steps of conducting each

examination site. However, this subject thought that some of the video clips were distracting as she could see other people moving in the background behind the patient. The instructional designer re-shot the videos that had the distractions in the background.

This subject also thought that incorporating sound into the video clips could have made the module more interesting to view. The instructional designer thought about incorporating sound into the video clips, but refrained because of all the video clips that were used in the module. Incorporating sound would have made the file size of the module larger and could have caused download problems.

Small Group Demographic Data

The demographic survey was administered to 22 first-year dental hygiene students who participated in the *small* group session. A summary of the results are shown in Table 1. All 22 of the participants in the sample population represented the target population. In addition, all 22 of the participants were females. The participants varied greatly in age as 14 of the students were in the 18-25 age range, four were in the 26-30 age range, three were in the 31-35 age range, and one was older than 36 years old. The ethnic background of the participants also varied greatly with 14 of the participants being Asian, 4 participants being Filipino, 3 participants being Part-Hawaiian, and 1 participant being "other." 19 of the 22 participants listed English as their first language. 3 of the 22 participants listed their second language as Japanese, Chinese or Filipino.

Table 1

Demographic Data

1. What is your age?			
(14) 18-25	(4) 26-30	(3) 31-35	(1) above 36
2. What is your gender?			
(0) Male	(22) Female		
3. What is your ethnicity? (Choose only one)			
(14) Asian	(0) Caucasian	(4) Filipino	(3) Part-Hawaiian (1) Other
4. Is English your first language?			
(19) Yes	(3) No		
5. If "no" to question #4, what is your first language?			
(1) Japanese	(1) Chinese	(1) Filipino	
6. Have you ever worked in a dental setting?			
(13) Yes	(9) No		
7. If "yes" to question #6, what was your position or title?			
(11) Dental Assistant	(1) Receptionist	(0) Office Manager	(2) Other
8. Do you own your own computer?			
(21) Yes	(1) No		
9. Do you know how to navigate through a Web site?			
(22) Yes	(0) No		
10. What type of connection do you have?			
(20) High-Speed (DSL or Cable)	(2) Dial-up		
11. Have you ever watched videos on your computer?			
(19) Yes	(3) No		
12. Do you know what oral cancer is?			
(22) Yes	(0) No		
13. Have you had an oral cancer examination performed by your dental health professional?			
(12) Yes	(10) No	(0) Not sure	
14. If "yes" to question #13, did the dental health professional explain what they were doing?			
(9) Yes	(2) No	(1) Not sure	
15. Do you know of anyone who has had oral cancer?			
(0) Yes	(22) No		

Of the 22 participants, 13 worked in a dental office. Of the 13 that worked in a dental office, 11 listed "dental assistant", 1 listed "receptionist" and 2 listed "other."

The participants were also asked if they owned their own computers. Of the 22 participants, 21 listed "yes" and 1 listed "no" to owning their own computer. Also, of the 22 participants owning their own computer, 20 indicated that they had high-speed connection and 2 indicated that they have dial-up. All 22 participants could navigate through a Web site. Of the 22 participants, 19 had watched a video on their computer while 3 has never watched videos on their computer.

All 22 participants indicated that they knew what oral cancer was and that they did not know of anyone with oral cancer. 12 of the participants indicated that they had an oral cancer examination performed by their dental health professional while 10 participants indicated not having an oral cancer examination done. Of the 12 participants who indicated that they had an oral cancer examination performed by their dental health professional, 9 received explanation of the examination process, 2 participants did not receive an explanation, and 1 participant was not sure.

Test Data Analysis

Individual Students' Pre-Test and Post-Test Scores: Psychomotor Skills

Results of the psychomotor pre- and post-test scores by participants are shown in Figure 10. All of the 22 participants showed an increase in their psychomotor skills assessment from their pre-test to post-test scores. Of the 22 participants, 15 had a 50-65% increase from their pre- to post-test scores, 6 had a 30-45% increase from their pre- to post-test scores while 1 had a 20% increase from pre-test to post-test scores.

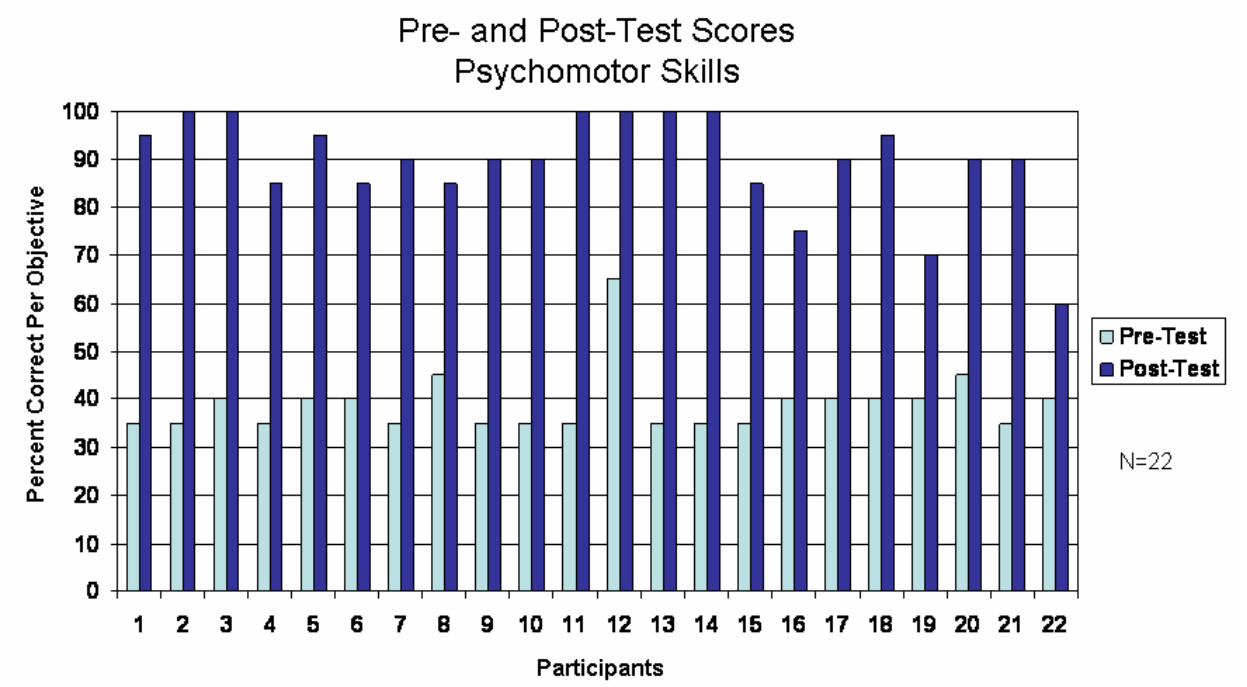

Figure 10. Comparison of pre- and post-test scores by participants bar chart.

The results clearly showed that viewing an interactive multimedia module on the oral cancer examination techniques could teach first-year dental hygiene students the psychomotor skills necessary to perform the terminal objective, which was to perform a thorough oral cancer examination on a real patient.

The pre-test and post-test scores indicated anomalies occurred with two of the participants as shown in Figure 11. The first anomaly, participant #12, was the only one to score 65% on the pre-test which may have resulted from her experience working in a dental office as a dental assistant. The second anomaly, participant #22, was the only participant to score only 20% more from the pre- to the post-test. The results could have been due to the amount and time the participant viewed the module or from the time the participant viewed the module to the time when she was tested.

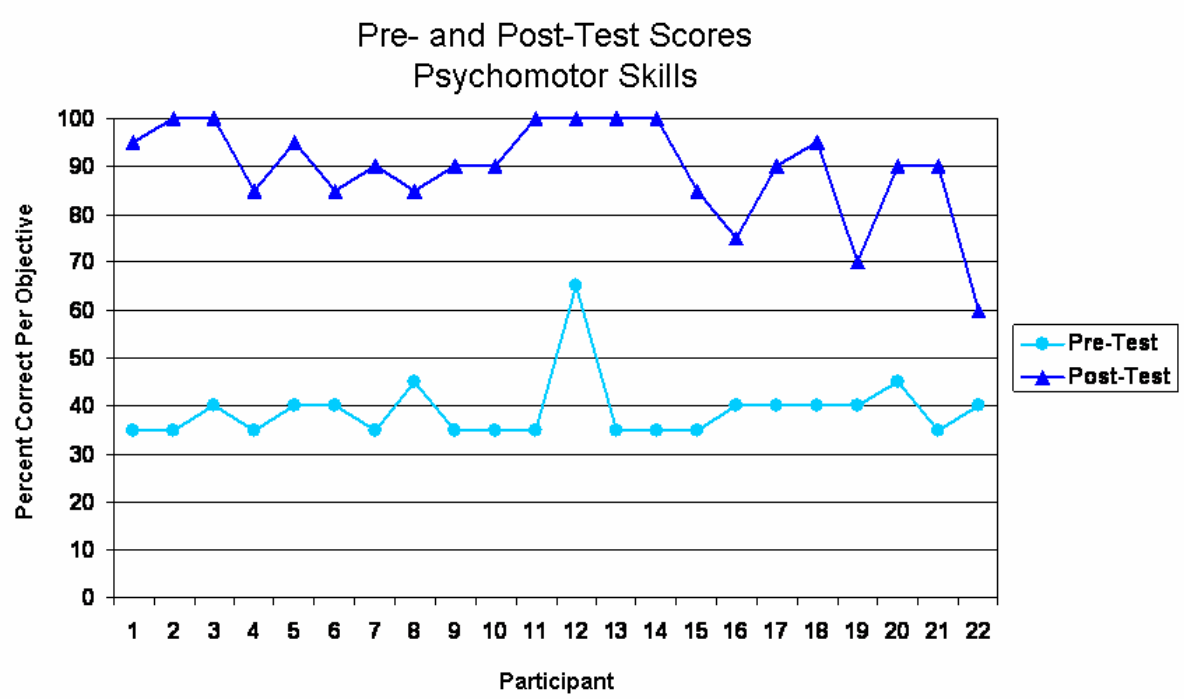

Figure 11. Comparison of pre- and post-test scores by participants line chart.

Comparison of Pre-Test and Post-Test Scores by Examination Sites

The instructional designer also looked into how each participant scored on each individual examination site to get a better understanding of which site needed to be revised or improved on in the module. The examination sites included the face, head, neck, TMJ, lymph nodes, lips, vestibule, mucosa, pharynx/tonsils, gingival, palate, tongue, and floor of the mouth. Results of the scores per examination site are shown in Figure 12. The 13 examination sites had a 75-100% increase from pre-test to post-test scores. These results also clearly indicated that the interactive multimedia instructional module could teach the first-year dental hygiene students the oral cancer examination techniques. The tongue, lymph nodes and face post-test scores were less than 60% correct. The instructional designer observed that the scores were low in these areas because of the multiple steps associated with conducting the examination of the tongue, lymph nodes and face.

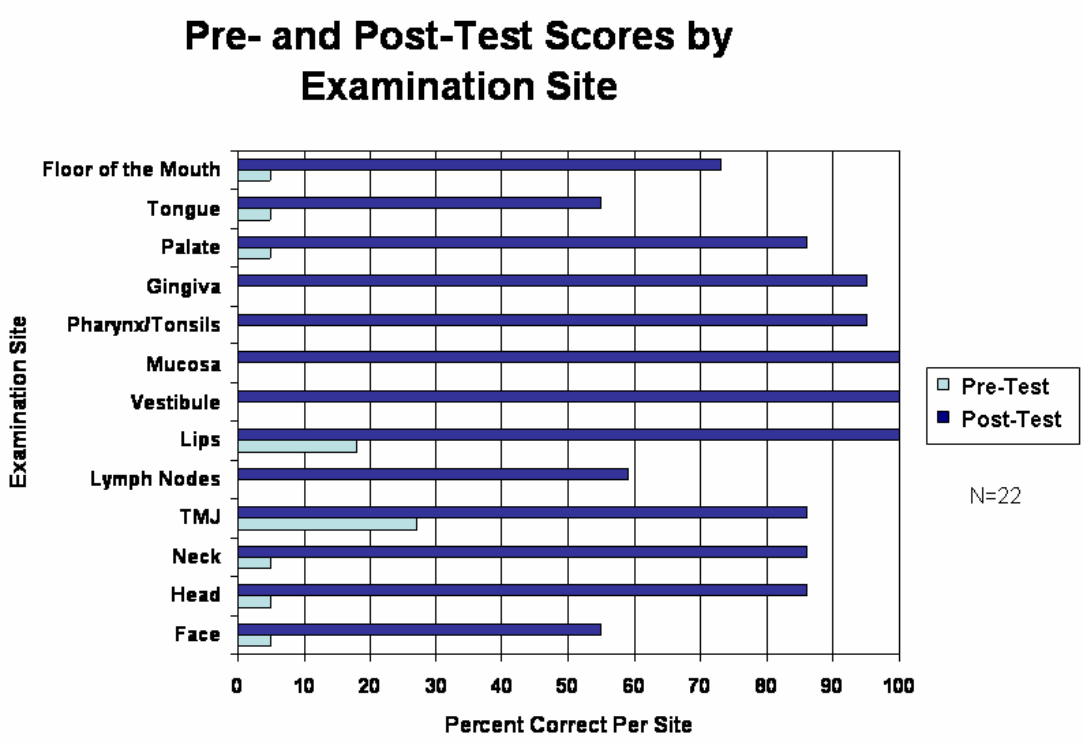

Figure 12. Comparison of pre- and post-test scores by examination site bar

Many of the participants observed the dorsum, ventral and lateral borders of the tongue but did not palpate, which may have lead to a lower percentage than the other examination sites. In addition, many of the participants palpated the lymph nodes correctly but missed one or two sites. The instructional designer believed that the module was clear enough and depicted every lymph node to be examined, but that the participants may have had too many sites to remember during the actual examination. Finally, many of the participants palpated and observed the face appropriately, but many forgot to ask the patient to remove her eye glasses. Upon further review of the interactive instructional module, the instructional designer noticed that there was no mention of removing the eye glasses prior to conducting the extraoral examination, which may have resulted in a score less than 60%.

The instructional designer wondered why the TMJ examination site was higher in the pre-test scores than any other site. After the pre-test psychomotor skills assessment, the

participants' anecdotal data showed that they knew how to do the TMJ examination because they remembered their dentist only checking that particular site and asking the participants to open and close their mouths. The results show that dental health professionals are conducting the oral cancer examination; however, it does not indicate that the dental health professional are performing a thorough examination of all sites.

Individual Students' Pre-Test and Post-Test Scores: Cognitive Knowledge

Results of the cognitive pre- and post-test scores by participants are shown in Figure 13. Of the 22 participants, 15 had an increase of 5-24% from their pre- to post-test scores, 4 had 0% gain, and 3 had a decrease of 4-5% from their pre- to post-test scores. Further analysis of each objective is shown in Figure 14. Results show that of the 21 multiple-choice questions, 11 of the questions had an increase of 5-55% from pre- to post-test scores, 8 had a 0% increase from pre- to post-test scores, and 2 had a decrease of 5-27% from pre- to post-test scores. The 5-55% increase in scores may have resulted in the participants experience with prior knowledge on the subject matter.

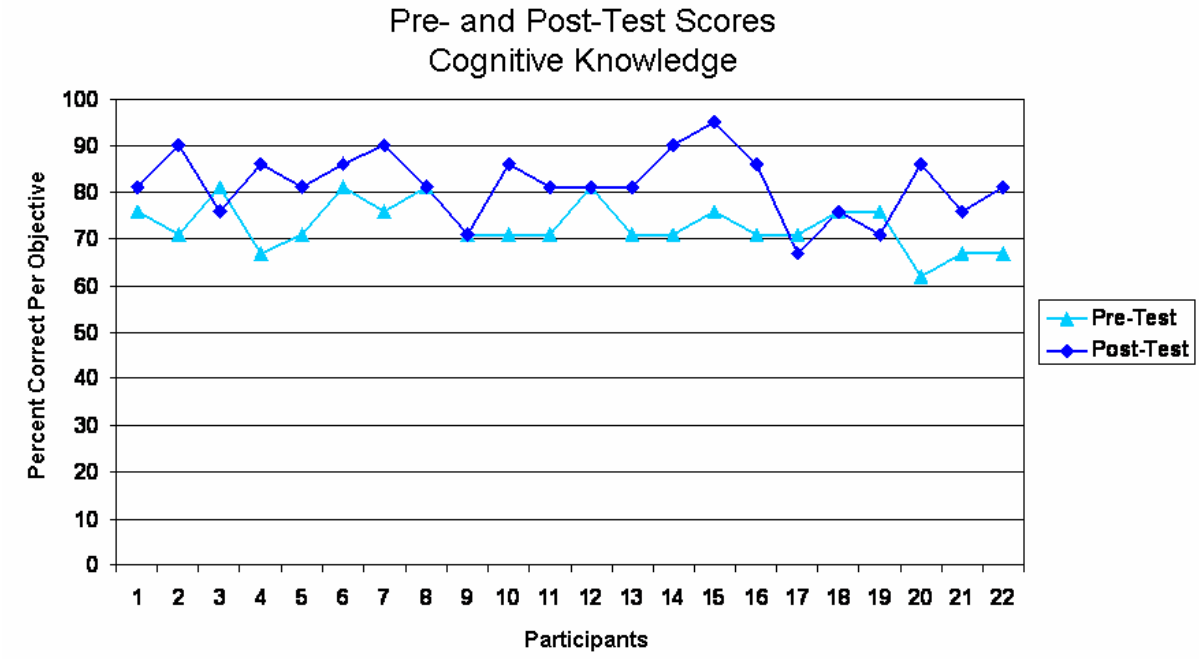

Figure 13. Comparison of cognitive pre- and post-test scores by participants line chart.

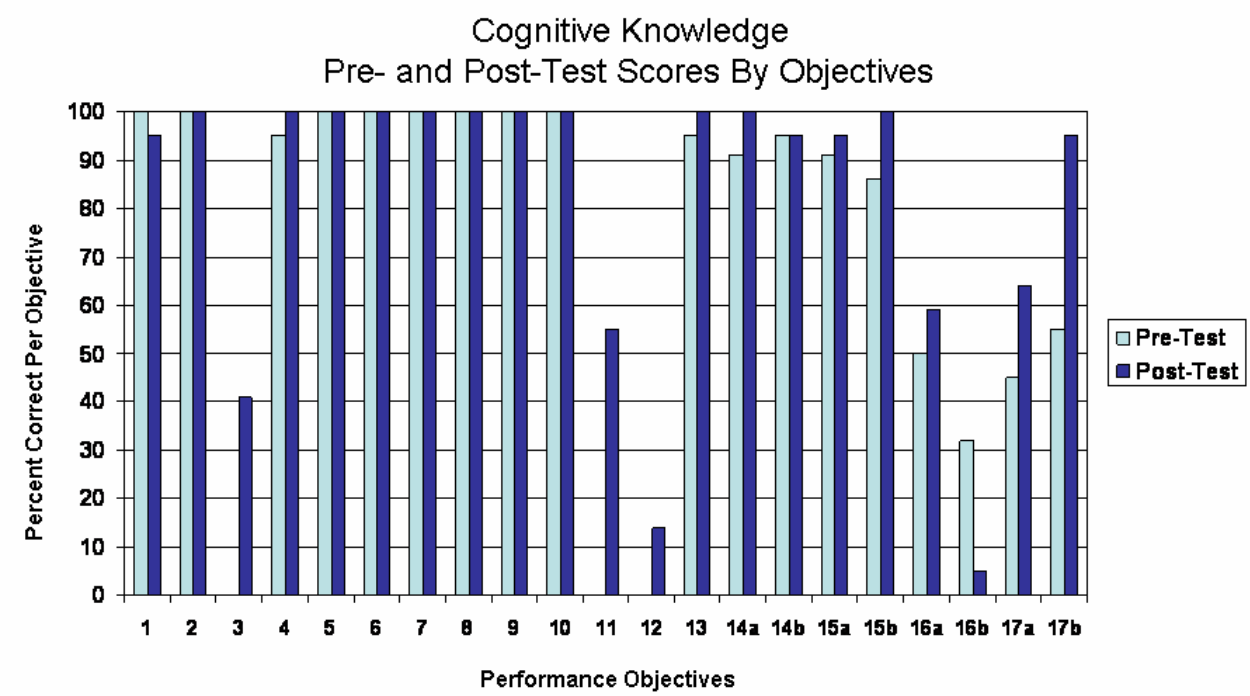

Figure 14. Comparison of cognitive pre- and post-test scores by objectives bar chart.

Comparison of Pre-Test and Post-Test Scores by Objectives

The instructional designer analyzed Objective 1 and Objective 16b which had a decrease from pre- to post-test scores of 5-27%, with Objective 16b scoring the latter. Upon further examination of Objective 1, it was noted that the participant answered the objective correctly on the pre-test, but then answered the objective wrong on the post-test. It was concluded that the participant may have clicked on the wrong bubble for the answer, as the distracter questions were clearly not the answer. Objective 16b asked the participants which of the following pictures below depicts a bi-lateral palpation technique as shown in Figure 15.

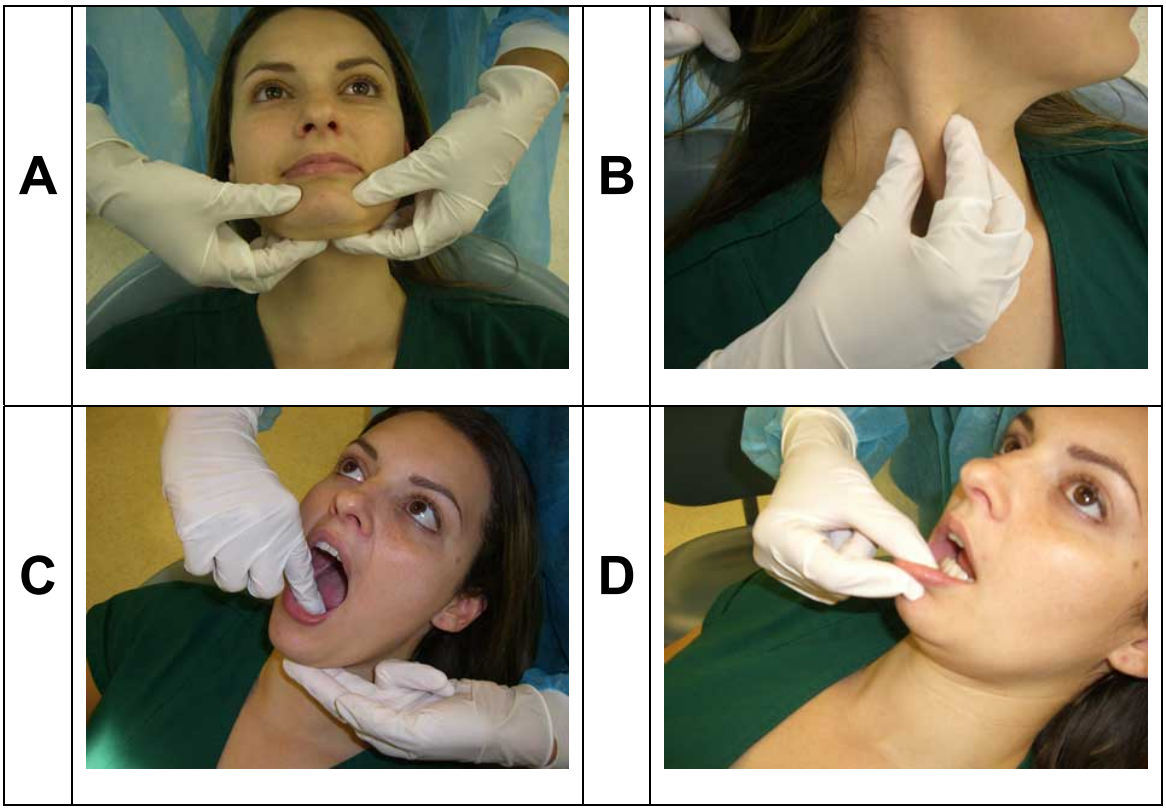

Figure 15. Objective 16b.

Of the 22 participants, 32% answered the question correctly on the pre-test, but only 5% answered the question correctly on the post-test. The instructional designer concluded that the participants may have been confused with the bi-digital palpation definition. The participants may have thought that when palpating the cervical lymph node chain with the use of a finger or fingers and a thumb from each hand applied simultaneously in coordination indicated that it was a bi-lateral palpation technique. However, bi-lateral palpation technique is the use of two hands at the same time to examine corresponding structures on the opposite sides of the body. The picture the participants chose as the answer clearly showed that it did not meet the correct definition of bi-lateral palpation. The picture showed only one hand that examined only one-side of the lymph node. If the picture had shown two-hands examining the left and right side lymph

nodes, than the answer would be correct. Therefore, the instructional designer concluded that the participants may have interpreted the definitions wrongly.

The final anomaly the instructional designer analyzed were Objectives 3, 11 and 12. Objectives 3, 11 and 12 asked the participants to list all the components that make-up the extraoral and intraoral examination. Objectives 3, 11 and 12 showed a pre-test score of 0% suggesting that the dental hygiene students did not list all the components that made-up the extraoral and intraoral examination.

Objective 12; however, was the only objective where the participants scored 15% more from the pre- to post-test. The instructional designer concluded that the students scored low because they were complacent in listing all the components of the examination. The instructional designer found this to be true because the participants scored an increase of 40% from pre- to post-test for Objective 3 and an increase of 55% for Objective 11. The increase in scores for Objectives 3 and 11 suggested that the students could answer the individual sections correctly, but may have had too many components to list for Objective 12. In addition, the interview data indicated that the low scores on Objective 12 may have resulted because the participants only wanted multiple-choice questions instead of fill-in-the-blank questions.

Comparison of Psychomotor Skill and Cognitive Knowledge on Pre- and Post-Test Scores

The data analyzed showed that the participants on the psychomotor skills assessment had all achieved an increase in scores from 5-50%, but 2 participants did not pass at the 75% competency level. The cognitive knowledge scores showed that 3 participants did not pass at the 75% competency levels. The data analyzed may indicate that the participants learned more through viewing the techniques than reading about the techniques.

Anecdotal Data

The participants were given one week to view the module before taking the psychomotor skill post-test examination. During the one week period, many of the participants approached the instructional designer and commented on the usefulness and the step-by-step process of conducting the extraoral examination. The participants also conveyed the wish to have an interactive instructional module for their other courses like dental charting and instrumentation.

In addition, the instructional designer received compliments on the module by other students in the program. They wished that they could have had something like that when they were in the first-year. Apparently, the participants of the study had accessed the module during lunchtime and some of the upper classman had expressed curiosity. The participants informed the other students that it was an interactive module that showed detailed steps on how to conduct the oral cancer examination.

Finally, the instructional designer received compliments from the other faculty in the Department who noticed that the students were more prepared for clinical activities than prior years. The faculty commented that it took them less time during the one-on-one sessions and that all they needed to do was to fine tune the students' skills. However, although the students showed progress in conducting the psychomotor component, many of the students did not know the correct sequence. It was suggested that the instructional designer add a section to the introduction of the instructional module to inform the viewers to pay close attention to the side menu bar, as it is the order in which the oral cancer examination should be done.

Interview Data

A summary of the interview questions are shown in Table 2. Of the 22 participants, 14 indicated that the best part of the module was the videos, 7 rated interactivity as the best part of

the module and 1 indicated that the sequence of the module was the best part. Also, of the 22 participants, 9 indicated that the test was least liked in the module, 2 indicated sequence as the least liked part in the module, 1 indicated interactivity as the least liked part in the module and 10 indicated that "other" was the least liked part of the module. The 10 participants that indicated "other" as their option noted next to their answer that it should have had an option to answer "none" as the least liked part of the module. The final question asked how the module could be improved. A majority of the participants indicated that sound incorporated into the video would have made the module more interesting and easier to understand. Some participants felt that they had to read too much, which may have decreased their motivation to access the module more than three times. The participants also indicated that examples of lesions and oral cancer lesions could have made it more interesting. Overall, the participants thought the module was well done.

During the interview questions, the instructional designer asked the participants how many times they accessed the module and how long they viewed the module. The instructional designer was surprised at the answers from the participants. The majority of the participants accessed the module once, for about 15-30 minutes in the one-week period that was given to them, before the post-test examination. There were 2 participants who accessed the module 3 times for about 15-40 minutes. Participant #22 who scored 60% on the post-test psychomotor skills assessment accessed the module once for only 30 minutes. However, other participants who accessed the module once for less than 30 minutes scored between 70-100% on the post-test psychomotor skills assessment.

Table 2

Interview Data

1. What aspects of the module did you like best?				
(7) Interactivity	(14) Video	(1) Sequence of Content	(0) Test Questions	(0) Other
2. What aspects of the module did you like least?				
(1) Interactivity	(0) Video	(2) Sequence of Content	(9) Test Questions	(10) Other
3. What ways or things could help to improve the module?				

- Audio stating what is being done as it is shown
- Nothing! I felt that this module was very helpful
- Excellent! I don't think there is anything to improve on
- More visuals
- Narration should be involved in the video clips
- Have the module contain only multiple-choice questions
- Simple to understand
- Have examples of lesions, ulcers etc..
- Well done, nothing to change

Attitudinal Data

The attitudinal survey is summarized in Figure 16. The results of the attitudinal survey indicated that the majority of the participants either "agreed" or "strongly agreed" that the instruction and instructional module was clear and easy to understand. However, participant #22 rated Item 3 as "undecided" indicating that the instructional module was not clear to her. In addition, participant #22 also rated Item 5 as "disagree" indicating that the module was not interesting to her. Finally, participant #22 also rated Item 7 as "agree" indicating that the module contained too much information for one sitting. This may have resulted in her score of 60% being the lowest in the post-test psychomotor skill assessment. It appeared that participant #22 was not fully motivated to participate in the instructional module on oral cancer examination techniques and possibly only participated in the study for the 5 bonus points.

Of the 22 participants, 15 rated Item 21 as "strongly agree" and 7 rated Item 21 as "agree" that the module was useful to them as dental hygiene students. Eleven of the 22 participants rated Item 23 as "strongly agree" and 9 rated Item 23 as "agree" that the module increased their knowledge on how to perform the oral cancer examination techniques.

Attitudinal Survey

		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	Instructions					
1	The instructions were clear.	8	14	0	0	0
2	The instructions were easy to understand.	10	12	0	0	0
3	The instructional module was clear.	8	13	1	0	0
4	The instructional module was easy to read.	12	10	0	0	0
	Content and Layout					
5	The module was interesting.	10	10	1	1	0

Figure 16. Summary Statistics of Attitudinal Survey.

6	The module followed good sequence.	10	10	2	0	0
7	The module contained too much information for one sitting.	1	3	2	13	3
8	The module contained too much information in each section.	0	3	1	14	4
9	The terms in the module were adequately defined.	6	14	2	0	0
10	The module took too long to complete.	0	1	1	15	5
11	The video clips adequately represented the topic.	4	13	2	3	
12	The video clips in each segment helped preview the next section of the module.	6	11	5	0	0
13	The video clips were clear.	7	13	2	0	0
14	The video clips were easy to see.	9	11	2	0	0
15	The still pictures were clear.	7	13	1	1	0
16	The still pictures were easy to see.	6	14	2	0	0
17	The video clips helped increase my learning.	14	6	2	0	0
18	The test questions were easy to understand.	7	15	0	0	0
19	The video clips helped to answer the test questions.	9	13	0	0	0
20	The module helped to systematically perform the oral cancer examination	10	11	1	0	0
	Attitudinal					
21	The module will be useful to me as a dental hygiene student.	15	7	0	0	0
22	The module increased my cognitive knowledge on oral cancer.	7	10	5	0	0
23	The module increased my knowledge on how to perform the oral cancer examination.	11	9	2	0	0
24	When I become a licensed dental hygienist, I will perform the examination on all patients on a routine basis.	6	12	4	0	0

Additional Comments:

- Good job!
- Time from initiation to post-test was too long
- Helpful and easy to understand
- Liked learning through video clips & exactly how to perform the extra and intraoral examination
- Helpful in understanding how to palpate each area and in what sequence
- It helped to be able to review the video clips as often as I liked and to be able to perform the examination on myself while watching the video
- Great job! Wish we could have more detailed videos
- Sound in the video would be great.

Figure 16. Summary Statistics of Attitudinal Survey (continued).

CHAPTER V

DISCUSSION

Notable Findings

According to Yellowitz and Goodman (1995), the researchers found that 16.7% of the dentists did not complete a routine oral cancer examination for most of their patients. Another study by Griffith (2004), reported that 47% of the dental hygienists did not conduct an oral cancer examination. The results from the present demographic survey indicated that 45.4% of the students who had been seen by a dental health professional did not receive an oral cancer examination as part of their routine care. The current findings suggest that the dental health professionals still do not perform this vital examination. The dental health professionals need to conduct the oral cancer examination on all patients on a routine basis to detect early lesions of oral cancer.

Similar to Dowdings findings in 1991, the results of this survey indicated that all of the participants improved on their psychomotor skills assessment after viewing the videos in the interactive multimedia instructional module. The results of the present study showed an increase of about 36% on all participants' psychomotor skills post-test scores. These results also validate Suprise and Mitchell (1997) findings that "interactive video instruction is particularly effective for training motor skills, procedures, or processes" (pg. 531).

The participants indicated during their interview sessions that the video and interactivity components of the module were the best parts. 7 of the 22 participants indicated interactivity as the best part in the module, which is similar to the findings by Carles and Elen (2003) who reported "interactivity is the main strength of multimedia" (pg. 20).

Teaching dental hygiene students the psychomotor skills necessary to conduct a thorough oral cancer examination is a vital part of their learning. With the lecture-based format and paper-based handouts already being utilized, the instructional designer needed to create an interactive multimedia instructional module to supplement the existing lecture materials. The interactive multimedia instructional module on oral cancer examination techniques proved that students can learn through watching videos and that hopefully, they will conduct this vital examination on all their patients on a routine basis.

Recommended Revisions

The interview data and attitudinal data from the participants suggested that sound be incorporated into the video clips to make the module more interesting. Another revision to the module would be to film clearer video shots. Some of the video clips were a little dark which may have caused the viewers to not see the video clips clearly. One last revision would be to make the oral examination checklist more detailed so that grading each examination site would be more consistent.

Summary

What Worked

There were several aspects of the project that worked well for this study. The instructional designer felt that the five bonus points given was a great motivator for completing the informed consent, demographic survey, pre- and post-test psychomotor skills assessment, pre- and post-test cognitive multiple-choice questions, attitudinal survey, and interview questions. The instructional designer informed the students that the five bonus points would be credited to their lecture or lab grade, whichever would benefit them the most. All students agreed to the five bonus points.

Secondly, the instructional designer felt that creating an interactive multimedia instructional module and incorporating short video clips on the oral cancer examination techniques had an impact on the students' learning ability to demonstrate a psychomotor skill. Although a paper-based format would have been easier to create, the interactive multimedia instructional module gave the students a real time view of how each site should be examined.

Thirdly, the instructional designer felt that having immediate access to the students was a big bonus. Planning the psychomotor skills assessment was easy to schedule with the students.

Finally, the IT specialists in the Educational Technology Department designed a program that allowed the instructional designer to upload all of the surveys and pre- and post-test multiple-choice questions for the students to access anytime. The instructional designer was able to download the results in a spreadsheet format, which saved time in not having to manually calculate the data.

What Did Not Work

The two content experts missed one of the video clips in the module that portrayed the wrong examination technique. The instructional designer felt that the content experts were very busy and unforeseen circumstances arose during the revision of the module that may have caused them to overlooked that video clip. As mentioned in the previous section, having the students answer the survey form on-line was a big bonus to this study, but 1 participant took over one week to answer the post-test multiple-choice questions, the attitudinal survey and the interview questions. This caused delay in analyzing the data.

What Went Wrong

Many of the students were confused when asked to complete the post-test multiple-choice questions. The instructions in the introduction part were not clear because the instructions

mentioned "pre-test" instead of "post-test." The students had mentioned that they had to access the post-test questions twice to make sure that they were taking the correct exam.

What Went Well

The instructional designer felt that the video files were downsized enough for the students to access the module using high-speed and dial-up connection. The instructional designer was worried that the video file size would be too large for some of the students to access.

The storyboard for the video taping portion was also a major factor in the study that made the process go well. The storyboard gave the instructional designer a template to focus on when shooting the videos and determining what angle and shot would be the best. This part of the design process saved a lot of time when editing the videos for the on-line module.

Next Time

The instructional designer felt that more interactivity in the module and test questions within the module would have better prepared the students to perform the psychomotor skills in a systematic way.

Future Developments

There are many ways in which this instructional module could be utilized in the future. However, before it can be implemented into the curriculum, all necessary changes to the instructional module regarding grammatical errors, spelling, and sentence structure need to be made. Once all of the changes are made, the instructional designer would like the Dental Hygiene Department to adopt the instructional module into their curriculum as an adjunct to the existing oral cancer examination lecture. In addition, the instructional designer would like to incorporate additional content on how to identify and describe lesions, add-in multiple-choice

test questions within the module to provide the students with immediate feedback, create a DVD package that would allow the students to have their own copies of the materials in case the Internet fails, utilize the instructional module as a continuing education course for health professional, and to create an interactive multimedia instructional module for patients to conduct their own oral cancer examination.

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Appendix A

Instructional Strategy Plan

Instructional Strategy Plan

Pre-Instructional Activities:	
Motivation:	All students who enter the dental hygiene program are highly motivated, willing to learn and optimistic. Students will also be motivated to complete this module because successful completion is required to advance into the clinical setting.
Objectives:	The objective of this module is for the beginning dental hygiene students to learn the basic techniques and process of performing the head, neck and mouth examination. In other words, the goal for each student is to learn how to analyze the process and perform the proper techniques in conducting a head, neck and mouth examination.
Prerequisite Skills:	Before beginning this instructional module, it is required that the dental hygiene students complete the core requirements the institution and successfully pass the pre-requisite dental hygiene courses before entering the program. The pre-requisite courses consist of Physiology, Physiology Lab, Microbiology, Microbiology Lab, Biochemistry 241 or Chemistry 151. The dental hygiene students will need to possess the reading, writing, analytical and comprehensive skills to successfully complete this module. The dental hygiene students will be required to complete all readings appropriate to complete this module.
Testing:	
Pretest:	The pretest consists of multiple choice and short answer questions and a psychomotor skills assessment component. These assessments will be administered prior to the instructional module to find out what knowledge and skills students have prior to learning.
Posttest:	The posttest consists of similar multiple choice and short answer questions. In addition, a psychomotor skills assessment will be administered after the posttest to evaluate if the students can transfer what they learned from the module to a real life setting.

Follow-up activities:
Remediation: Students will be directed to review material they had errors on. Additional resources and materials will be provided to students for their review. Enrichment: Additional modules and materials will help students to continue learning the concepts of oral cancer and the techniques of conducting the head, neck and mouth examination. Further clinical practice will give the students more experience in conducting the oral cancer examination. Web sites will be provided to give additional sources of information.

Objectives Sequenced and Clustered

Cluster 1	Learning Time: 45 minutes
Title: Extraoral and Intraoral Components	
Objectives: 1. Define lymph nodes 2. Define TMJ 3. Identify components of the extraoral examination 4. Define mucosa 5. Define pharynx / tonsils 6. Define the floor of the mouth 7. Define gingiva 8. Define tongue 9. Define soft palate 10. Define hard palate 11. Identify the components of the intraoral examination 12. Determine the components in conducting an extraoral and intraoral examination	
Cluster 2	Learning Time: 15 minutes
Title: Palpation Techniques	
Objectives: 13. Define palpation 14. Define digital 15. Define bi-digital 16. Define bi-lateral	

17. Define bi-manual 18. Identify palpation techniques 19. Determine the techniques used in conducting an oral cancer examination
Cluster 3 Learning Time: 45 minutes
Title: Terminal Objective
Objective: 20. Conduct a thorough oral cancer examination and determine if the proper techniques are utilized

Appendix B

Human Subjects Application

CHS 04/04 CHS #_____

Application for New Approval of a Study Involving Human Subjects

University of Hawai'i, Committee on Human Studies (CHS)
Spalding Hall 253, 2540 Maile Way, Honolulu, Hawai'i 96822
Telephone: (808) 956-5007

Date: July 12, 2005
PI (name & title): Kristine Osada Email: kmsato@hawaii.edu Phone: 956-5605
Department: Educational Technology
[ ] Faculty or Staff [X] Student - name of supervising professor: Dr. Shirley Yamashita
Training in Human Subject Protection: When, where, & what? n/a

Project Title: An Interactive Multimedia Instructional Module on how to Conduct a Head, Neck and Mouth Examination
Proposed Sponsoring Agency:University of Hawaii Department of Educational Technology
Start Date: 9/1/05
Complete Agency address: 1776 University Ave., Wist Hall 232 Honolulu, HI 96822

1. Summarize your proposed research. Outline objectives and methods.

Research will be conducted to test the effectiveness of the interactive multimedia instructional module. Instruction will be on teaching first year dental hygiene students on how to conduct a head, neck and mouth examination. An informed consent form will be given to the students prior to viewing the interactive multimedia instructional module. Once completed, a demographic survey will be given, and then the students will be given a psychomotor skills assessment test before and after viewing the module. In addition, after the post-test is given, an attitudinal survey will be given to gain feedback on the module. Lastly, a semi-structured interview after the attitudinal survey will be conducted to gain further information on how to improve the instructional module. The instructional module will consist of short video clips demonstrating examples and non-examples of techniques and process in conducting the head, neck and mouth examination.

The terminal objective for the instruction will be for the first year dental hygiene students to conduct a thorough head, neck and mouth examination on a real patient.

2. Summarize all involvement of humans in this project (who, how many, age, sex, length of involvement, frequency, etc.) and the procedures they will be exposed to. Attach survey instrument, if applicable.

There will be four groups of subjects involved in this study: (1) content experts, (2) the actors and technical support for the production of the video, Web designer expert, (3) a dental hygiene faculty to sit as a patient, licensed dentist and the learners participating in the evaluation of the instructional module.

Before the creation of the instructional module, two content experts will aid the researcher in the development and implementation of the instructional module. The first content expert is a

female, age 50. She is an oral pathology assistant professor. The other content expert is a female, age 55. She is the instructor who teaches the head, neck and mouth examination. Both content experts will be interviewed in an informal, semi-structured meeting for 2-3 hours in the beginning phase of the project. Thereafter, the researcher will do 1 hour consultation a week with the content experts throughout the development of the instructional module.

The actors in the video production will consist of two faculty members from the dental hygiene department. One faculty will be the clinician demonstrating the process and techniques of performing the head, neck and mouth examination. The other faculty will be the patient in the chair being demonstrated on. The two faculty members are female ages 30 and 33. The two faculty members will be part of the production phase of the video that will last approximately 3 weeks. The majority of the filming will be conducted on the weekends, mainly on Sundays, for about 3-4 hours.

An adult male, age 32, will be the technical support assistant who will help the researcher with setting up and breaking down of the video equipment. The majority of his participation will be in the beginning for about 1 hour and at the end of the production phase for about another hour.

The next subject involved in the creation of the instructional module will be a Web designer expert. The Web designer expert, male, age 32 will be needed to assist the researcher in putting together the information on to a Webpage or CD-Rom using Macromedia Flash as the application of choice. The Web designer will be needed for about 4 hours in the beginning and for short 30 minute consultation throughout the instructional module.

The next subject involved in this study will be a dental hygiene faculty member who will sit as a patient when the learners are conducting the psychomotor skills assessment (See attached checklist of the psychomotor skills checklist). This female faculty, age 32, will be needed to sit as a patient for approximately 4 hours a day, for two days. The first testing will be done on Monday and the second will be done on Friday.

Two licensed dentists, also part-time faculty, will be in the clinical setting to oversee the psychomotor skills assessment phase. One female dentist, age 50, will be needed for 4 hours on Monday, plus an additional 2 hours during the one-on-one testing of the module. The other female dentist, age 43, will be needed for approximately 4 hours on Friday.

The last group of subjects involved in this study will be those who will be testing the module. Two one-on-one participants will be needed for about 2 hours to view the instructional module and perform the head, neck, mouth examination to give feedback on content, structure, process, clarity, and overall effectiveness. The first female participant is age 25 and the second female is age 22.

The small group will be made up of 15-20 first year dental hygiene students ranging in ages 18-35 years old. The students will be needed for approximately 2 ½ hours to fill out the informed consent form (see attached), fill out the demographic survey (see attached), view the instructional module, conduct the head, neck and mouth examination, fill out the attitudinal survey (see attached) and to conduct the one-on-one semi-structured interview (see attached). The small group will be broken up into two groups. One group will go on Monday the other group on Friday.

Here is a detailed outline of the timeline to be used on the testing day.

Introduction: (5 minutes)

Informed consent: (5 minutes)
Demographic survey: (5 minutes)
Pre-test: (30 minutes)
Viewing Instructional Module: (1 hour)
Post-test: (20-30 minutes)
Attitudinal survey: (5 minutes)
Interview: (5-10 minutes)

Check whether any subject of your research will be selected from the following categories:

[ ] Minors [ ] Pregnant Women [ ] Mentally Disabled[ ] Fetuses
[ ] Abortuses [ ] Physically Disabled [ ] Prisoners

3. Research involving humans often exposes the subjects to risks: For the purpose of this application, "risk" is defined as exposure of any person to the possibility of injury, including physical, psychological, or social injury, as a consequence of participation as a subject in any research, development, or related activity which departs from the application of those established and accepted methods necessary to meet his needs, or which increases the ordinary risks of daily life, including the recognized risks inherent in a chosen occupation or field or service.

a. Check all the risks to human subjects that apply to your project:
[X] Physical trauma or pain
[ ] Deception
[ ] Experimental diagnostic procedures
[ ] Side effects of medications
[X] Loss of privacy
[ ] Experimental treatment procedures
[ ] Contraction of disease
[ ] Worsening of illness
[ ] Other – explain
[ ] Psychological pain
[ ] Loss of legal rights

b. Check procedures that will be used to protect human participants from risks:
[X] M.D. or other appropriately trained individuals in attendance
[X] Sterile equipment
[ ] Precautions in use of stressor or emotional material (explain below)
[ ] When deception used, subjects fully informed as to nature of research at feasible time (explain below)
[ ] Procedures to minimize changes in self-concept (explain below)
[X] Confidentiality of subjects maintained via code numbers and protected files
[X] Anonymity - no personally identifiable information collected
[ ] Others-- explain

Consent forms for talent to participate in video production phase will be signed by participants and for the learners to sign before the implementation of the instructional module.

c. Has provision been made to assure that Human Subjects will be indemnified for expenses incurred as a direct or indirect result of participating in this research?

[ ] Not applicable

[X] No - The following language should appear in the written consent form: ***I understand that if I am injured in the course of this research procedure, I alone may be responsible for the costs of treating my injuries.***

[ ] YES, explain:

d. Are there non-therapeutic tests that the research subjects may be required to pay for?

[ ] Not applicable

[X] No

[ ] Yes - explain below. The following language should appear in the written consent form: ***I understand that I may be responsible for the costs of procedures that are solely part of the research project.***

4. Describe mechanism for safety monitoring: How will you detect if greater harm is accruing to your subjects than you anticipated? What will you do if such increased risk is detected?

There may be three areas where physical trauma could occur: 1) during the production phase of demonstrating the techniques in conducting a head, neck and mouth examination, 2) during the one-on-one testing of the module and 3) when the small group will be conducting the examination. Because the head, neck and mouth examination is a non-invasive procedure it should not cause physical trauma, but there is a slight risk that it could occur. Non-invasive means there is no puncture to skin, tissue or bone. Basically what the examination involves is palpating the face, neck and head to check the various lymph nodes for lumps and examine the oral cavity with the disposable mirror to provide lighting and retraction of the lips and tongue. In addition, a sterilize gauze will be used to hold on to the tongue to examine the entire length of the tongue thoroughly on each side. The primary investigator will ask the participants if there are any questions or problems and remind them to verbalize any concerns that arise during the examination.

For safety precautions, the participants will utilize personal protection equipment when performing the examination. They will be given disposable gowns, masks, bonnets, gloves, air/water syringe tips, saliva ejector, mouth mirror, patient napkin, plastic barriers (for the chair, light handles, bracket table and cuspidor), and sterile gauze to minimize cross-contamination. The patient will be given safety glasses to wear during the intra-oral examination. The examination will be conducted in the dental hygiene clinical setting which is equipped with first aid kits. The head, neck and mouth examination is a routine clinical activity required of all dental hygiene students. All clinical activities require the students to train on other students to get a real view experience on working with live patients. To successfully pass this portion of the examination, the students perform these tasks on each other, where one is the clinician and the other is the patient.

During the production phase of the module, 15 minute breaks will be given to use the restroom, drink water and eat snacks.

5. Briefly describe the benefits that will accrue to each human subject or to mankind in general, as a result of the individual's participation in this project, so that the committee can access the risk benefit/ratio.

The major benefits for each participant will be to acquire knowledge on head, neck and mouth examinations, increase awareness of oral cancers and develop competent psychomotor skills needed to conduct the head, neck and mouth examination. In addition, if the results of this project are successful, the interactive instructional module can be further utilized as an instructional tool for continuing education credits for health professionals and used possibly as an informational tool to inform the public on how to conduct a head, neck and mouth examination. Furthermore, this module will prepare the students with a systematic process that will allow them to conduct a thorough head, neck and mouth examination, thereby, providing the basic care to their patients as licensed dental hygienist. Knowing how to competently perform the head, neck and mouth examination will increase the likelihood of detecting oral cancers at an early stage.

6. **Participation must be voluntary: the participants cannot waive legal Rights, and must be able to withdraw at any time without prejudice.** Indicate how you will obtain informed consent:

[X] Subject (or Parent/Guardian) reads complete consent form & signs (‘written’ form)
[ ] Oral briefings by PI or project personnel, with simple consent form (‘oral’ form). Explain below the reason(s) why a written consent form is not used
[ ] Other- explain

7. Are there any other local IRB's reviewing this proposal? [X] No [ ] Yes, Location: _____

I affirm:

(i) that the above and any attachments are a true and accurate statement of the proposed research and of any and all risks to human subjects.

Signed: _____ Date: _____

Principal Investigator

Signed: _____ Date: _____

Supervising Professor (required if PI is a student)
Date of Human Subject Protection Training: _____

Submit the ORIGINAL plus 12 copies of this form with the following attachments:

Three (3) copies of proposal
Thirteen (13) copies of all consent forms
Thirteen (13) copies of any other information to be read or presented to the participants
Thirteen (13) copies of verbal information to be given if short form is used
Thirteen (13) copies of the survey instrument
(Please consult with the CHS staff if providing the survey instrument is a problem.)

UNIVERSITY OF HAWAI'I

Committee on Human Studies

MEMORANDUM

August 5, 2005

TO: Kristine Osada
Principal Investigator
Educational Technology

FROM: William H. Dendle
Executive Secretary

SUBJECT: CHS #13872- "An Interactive Multimedia Instructional Module on How to Conduct a Head, Neck and Mouth Examination"

Your project identified above was reviewed and has been determined to be exempt from Department of Health and Human Services (DHHS) regulations, 45 CFR Part 46. Specifically, the authority for this exemption is section 46.101(b)(2). Your certificate of exemption (Optional Form 310) is enclosed. This certificate is your record of CHS review of this study and will be effective as of the date shown on the certificate.

An exempt status signifies that you will not be required to submit renewal applications for full Committee review as long as that portion of your project involving human subjects remains unchanged. If, during the course of your project, you intend to make changes which may significantly affect the human subjects involved, you should contact this office for guidance prior to implementing these changes.

Any unanticipated problems related to your use of human subjects in this project must be promptly reported to the CHS through this office. This is required so that the CHS can institute or update protective measures for human subjects as may be necessary. In addition, under the University's Assurance with the U.S. Department of Health and Human Services, the University must report certain situations to the federal government. Examples of these reportable situations include deaths, injuries, adverse reactions or unforeseen risks to human subjects. These reports must be made regardless of the source funding or exempt status of your project.

University policy requires you to maintain as an essential part of your project records, any documents pertaining to the use of humans as subjects in your research. This includes any information or materials conveyed to, and received from, the subjects, as well as any executed consent forms, data and analysis results. These records must be maintained for at least three years after project completion or termination. If this is a funded project, you should be aware that these records are subject to inspection and review by authorized representatives of the University, State and Federal governments.

Please notify this office when your project is completed. We may ask that you provide information regarding your experiences with human subjects and with the CHS review process. Upon notification, we will close our files pertaining to your project. Any subsequent reactivation of the project will require a new CHS application.

Please do not hesitate to contact me if you have any questions or require assistance. I will be happy to assist you in any way I can.

Thank you for your cooperation and efforts throughout this review process. I wish you success in this endeavor.

Enclosure

2540 Maile Way, Spalding 252, Honolulu, Hawai'i 96822-2303
Telephone: (808) 539-3955/(808) 956-5007, Facsimile: (808) 539-3954, Web site: www.hawaii.edu/irb

OMB No. 0990-0263

Protection of Human Subjects
Assurance Identification/IRB Certification/Declaration of Exemption
(Common Rule)

Policy: Research activities involving human subjects may not be conducted or supported by the Departments and Agencies adopting the Common Rule (56FR28003, June 18, 1991) unless the activities are exempt from or approved in accordance with the Common Rule. See section 101(b) of the Common Rule for exemptions. Institutions submitting applications or proposals for support must submit certification of appropriate Institutional Review Board (IRB) review and approval to the Department or Agency in accordance with the Common Rule.

Institutions must have an assurance of compliance that applies to the research to be conducted and should submit certification of IRB review and approval with each application or proposal unless otherwise advised by the Department or Agency.

1. Request Type	2. Type of Mechanism	3. Name of Federal Department or Agency and, if known, Application or Proposal Identification No.
[ ] ORIGINAL [ ] CONTINUATION [X] EXEMPTION	[ ] GRANT [ ] CONTRACT [ ] FELLOWSHIP [ ] COOPERATIVE AGREEMENT [ ] OTHER:_____	
4. Title of Application or Activity "An Interactive Multimedia Instructional Module on How to Conduct a Head, Neck and Mouth Examiniation"		5. Name of Principal Investigator, Program Director, Fellow, or Other Kristine Osada

6. Assurance Status of this Project *(Respond to one of the following)*

[X] This Assurance, on file with Department of Health and Human Services, covers this activity:
Assurance Identification No. F-3526 , the expiration date October 15, 2005 IRB Registration No. IORG0000169

[ ] This Assurance, on file with *(agency/dept)*_____, covers this activity.
Assurance No._____, the expiration date_____ IRB Registration/Identification No._____*(if applicable)*

[ ] No assurance has been filed for this institution. This institution declares that it will provide an Assurance and Certification of IRB review and approval upon request.

[X] Exemption Status: Human subjects are involved, but this activity qualifies for exemption under Section 101(b), paragraph 2 .

7. Certification of IRB Review (Respond to one of the following IF you have an Assurance on file)

[ ] This activity has been reviewed and approved by the IRB in accordance with the Common Rule and any other governing regulations.
by: [ ] Full IRB Review on (date of IRB meeting) _____ or [ ] Expedited Review on (date)
[ ] If less than one year approval, provide expiration date _____

[ ] This activity contains multiple projects, some of which have not been reviewed. The IRB has granted approval on condition that all projects covered by the Common Rule will be reviewed and approved before they are initiated and that appropriate further certification will be submitted.

8. Comments

CHS #13872

9. The official signing below certifies that the information provided above is correct and that, as required, future reviews will be performed until study closure and certification will be provided.		10. Name and Address of Institution
11. Phone No. *(with area code)*	(808) 956-5007	University of Hawaii at Manoa Office of the Chancellor 2444 Dole Street, Bachman Hall Honolulu, HI 96822
12. Fax No. *(with area code)*	(808) 539-3954	
13. Email:	dendle@hawaii.edu	
14. Name of Official William H. Dendle		15. Title Compliance Officer
16. Signature		17. Date August 5, 2005

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Appendix C

Timeline

Date	Event
April 12, 2005	Present Idea Paper to Committee
May 2005	Contact advisor to schedule meeting
July 1, 2005	Met with advisor to discuss proposal
July 2005 – August 2005	Write proposal (Chapter 1 – Chapter 4)
Late July 2005	Submit Human Subjects forms for approval
Late July 2005- Early August 2005	Meet with content and technical experts Find actors / demonstrators for video
August 12, 2005	Submit proposal draft #1 to advisor for approval
Middle of August 2005	Create instructional module Video tape Get approval from department chair, instructor and dental hygiene students
Early September 2005	Create test questions and psychomotor skills assessment form
Middle September 2005	Submit proposal draft #2 to advisor
Late September – Early October 2005	Conduct one-on-one sessions with the two students from the target group and with the content and technical experts
Late October 2005	Make revisions to Instructional Module
Early November 2005	Submit all materials to advisor for approval
Early December 2005	Conduct small group sessions
Late December 2005 – Late January 2006	Analyze data and write final paper
Early February 2006	Submit final draft paper #1 to advisor
Middle February 2006	Submit final draft paper #2 to advisor
Early March 2006	Submit final draft paper #3 to advisor
Late March 2006	Submit final paper for approval
Middle April 2006	Present results and electronic portfolio to faculty
May 2006	Graduate

Appendix D

Informed Consent Forms

Agreement to Participate in
Instructional Design Study on Conducting a Head, Neck and Mouth Examination

Kristine Osada
Primary Investigator
808-395-0631

This research project is being conducted as a component of an interactive multimedia instructional design process for a master's degree. The purpose of the project is to learn if the instruction being presented is effective. You are asked to participate because you are part of the target population for which this module is being developed.

Participation in the project will consist of filling out a form on background information about you, taking a psychomotor skill assessment before and after viewing the instructional module, completing an attitudinal survey and interview to gain feedback on the effectiveness of the module. The Data from the interview will be summarized into broad categories. No personal identifying information will be included with the research results. Completion of the form containing background data and the attitudinal survey should take no more than 5 minutes each. The instructional module will take 1 hour and the psychomotor skills assessment will take 30 minutes. The interview will take about 5-10 minutes.

The head, neck and mouth examination is a non-invasive procedure; therefore, the investigator believes there is little or no risk to participating in this research project. For safety precautions, the participants will be given personal protection equipment (e.g. disposable gowns, masks, bonnets, gloves, air/water syringe tips, saliva ejectors, mouth mirrors, patient napkins, plastic barriers to cover the chair and light handles, and sterile gauze) to minimize cross-contamination.

Participating in this research may be of no direct benefit to you. It is believed, however, the results from this project will help to create better interactive multimedia instructional modules to teach the dental, dental hygiene, medical and nursing students how to conduct a thorough head, neck and mouth examination on their patients.

Research data will be confidential to the extent allowed by law. Agencies with research oversight, such as the UH Committee on Human Studies, have the authority to review research data. All research records will be stored in a locked file in the primary investigators house for the duration of the research project. All other research records will be destroyed upon completion of the project.

Participation in this research project is completely voluntary. You are free to withdraw from participation at any time during the duration of the project with no penalty, or loss of benefit to which you would otherwise be entitled.

If you have any questions regarding this research project, please contact the researcher, Kristine Osada, at 395-0631.

If you have any questions regarding your rights as a research participant, please contact the UH Committee on Human Studies at (808)956-5007.

Participant:
I have read and understand the above information, and agree to participate in this research project. I understand that if I am injured in the course of this research procedure, I alone may be responsible for the costs of treating my injuries.

I herewith give my consent to participate in this project with the understanding that such consent does not waive any of my legal rights, nor does it release the Primary Investigator or the institution or any employee or agent thereof from liability for negligence.

_____
Name (printed)

_____ _____
Signature Date

Agreement to Participate in the
Production of a Video on Head, Neck and Mouth Examination

Kristine Osada
Primary Investigator
808-395-0631

This research project is being conducted as a component of an interactive multimedia instructional design process for a master's degree. The purpose of the project is to learn if the instruction being presented is effective.

Participation in the project will consist of demonstrating how to conduct a thorough head, neck and mouth examination. Directions will be given by the primary investigator on how to conduct the head, neck and mouth examination in a systematic and logical process. In addition, the primary investigator will guide the participants on the techniques to perform the head, neck and mouth examination. Production will take place over three weekends at the University of Hawaii at Manoa, dental hygiene clinic. Each session will be held for four hours on Sunday. Fifteen minute breaks will be given every two hours or as needed. Refreshments will be provided.

The head, neck and mouth examination is a non-invasive procedure; therefore, the investigator believes there is little or no risk to participating in this research project. For safety precautions, the participants will be given personal protection equipment (e.g. disposable gowns, masks, bonnets, gloves, air/water syringe tips, saliva ejectors, mouth mirrors, patient napkins, plastic barriers to cover the chair and light handles, and sterile gauze) to minimize cross-contamination.

Participating in this research may be of no direct benefit to you. It is believed, however, the results from this project will help to create better interactive multimedia instructional modules to teach the dental, dental hygiene, medical and nursing students how to conduct a thorough head, neck and mouth examination on their patients.

Research data will be confidential to the extent allowed by law. Agencies with research oversight, such as the UH Committee on Human Studies, have the authority to review research data. All images and videos will be stored in a locked file in the primary investigators house for the duration of the research project.

Participation in this research project is completely voluntary. You are free to withdraw from participation at any time during the duration of the project with no penalty, or loss of benefit to which you would otherwise be entitled.

If you have any questions regarding this research project, please contact the researcher, Kristine Osada, at 395-0631.

If you have any questions regarding your rights as a research participant, please contact the UH Committee on Human Studies at (808)956-5007.

Participant:
I have read and understand the above information, and agree to participate in this research project. I understand that if I am injured in the course of this research procedure, I alone may be responsible for the costs of treating my injuries.

I herewith give my consent to participate in this project and allow the Primary Investigator to use my voice or picture in the foregoing instructional module. I understand that such consent does not waive any of my legal rights, nor does it release the Primary Investigator or the institution or any employee or agent thereof from liability for negligence.

_____
Print name of Participant

_____ _____
Signature of Participant Date

Appendix E

Demographic Survey

1. What is your age?
    a. 18-25
    b. 26-30
    c. 31-35
    d. above 36

2. What is your gender?
    a. Male
    b. Female

3. What is your ethnicity? (choose only one)
    a. Asian
    b. Caucasian
    c. Filipino
    d. Part-Hawaiian
    e. Other_____

4. Is English your first language?
    a. Yes
    b. No

5. If "no" to question #4, what is your first language? _____

6. Have you ever worked in a dental setting?
    a. Yes
    b. No

7. If "yes" to question #7, what was your position or title?
    a. Dental assistant
    b. Receptionist
    c. Office manager
    d. Other_____

8. Do you own your own computer?
    a. Yes
    b. No

9. Do you know how to navigate through a Web site?
    a. Yes
    b. No

10. What type of connection do you have?
    a. High Speed (DSL or cable)
    b. Dial-up

11. Have you ever watched videos on your computer?
    a. Yes
    b. No

12. Do you know what oral cancer is?
    a. Yes
    b. No

13. Have you every had a head, neck and mouth examination performed by your dental health professional?
    a. Yes
    b. No

14. If yes to question #13, did the dental health professional explain what they were doing?
    a. Yes
    b. No

15. Do you know of anyone with oral cancer?
    a. Yes
    b. No

Appendix F

Oral Cancer Examination Checklist

Check	Criteria		Points	Points
Supplies and Preparation		-2 points/error	10	
	Disposable barriers on light handle, chair, bracket table, and water dispenser buttons			
	Air/water syringe tip connected			
	Saliva ejector connected			
	Patient napkin secured with alligator clip			
	2 pieces of sterile gauze			
	1 disposable mouth mirror			
	1 disposable mask, bonnet and gowns			
	1 disposable pair of examination gloves			
Patient Preparation and Comfort		-5 points/error	10	
	Explains head, neck and mouth examination to patient			
	Maintains optimal patient comfort (head positioning)			
Safety		- 5 points/error	10	
	Fulfills personal protective attire requirements			
	Has patient wear safety eyewear during intraoral exam			
Extra- / Intraoral Technique		-5 points/error	65	
	Examines the face appropriately			
	Examines the head appropriately			
	Examines the neck appropriately			
	Examines the lymph nodes appropriately			
	Examines the TMJ appropriately			
	Examines the lips appropriately			
	Examines the vestibule appropriately			
	Examines the mucosa appropriately			
	Examines the pharynx/tonsils appropriately			
	Examines the gingiva appropriately			
	Examines the palate appropriately			
	Examines the tongue appropriately			
	Examines the floor of the mouth appropriately			
Patient Instructions		-5 points/error	5	
	If any conditions found, refer to dentist for evaluation and possible referral to specialist			
	TOTAL POINTS:		100	

Appendix G

Multiple-Choice Test Questions

Participant #_____

Oral Cancer Examination
Pre- and Post-Test Multiple Choice Questions

1. Which statement best defines **lymph nodes?**
    a. Outer scab-like layer of solid matter formed by drying of a body exudates or secretion.
    b. A loose membranous layer of exudates containing microorganisms, precipitated fibrin, necrotic cells, and inflammatory cells produced during an inflammatory reaction on the surface of a tissue.
    c. Material, such as fluid, cells, and cellular debris, that has escaped from blood vessels and is deposited in tissues or on tissue surfaces, usually as a result of inflammation.
    d. Bean-shaped structures that are located throughout the body and are connected by a series of vessels similar to veins. It helps to filter out and destroy bacteria and toxic substances, but can also collect cancer cells that travel through the lymph vessels.

2. **Temporomandibular joint (TMJ)** is best defined as
    a. the joint that hinges the head to the body.
    b. the joint that hinges the lower jaw (mandible) to the skull.
    c. the joint that controls the movement of the leg.
    d. the joint that controls the movement of the arms.

3. List the components that make-up the extraoral examination?
    a. _____
    b. _____
    c. _____
    d. _____

4. Which of the following statements best defines oral **mucosa**?
    a. Inner lining of the cheeks and lips. It is non-keratinized and is continuous with the mucosae of the soft palate, under surface of tongue and the floor of the mouth.
    b. The area situated immediately posterior to the mouth and nasal cavity, food and air can pass through, important for vocalization.
    c. The tissue surrounding the roots of the teeth and covering the jawbone, considered an extension of the skin, connected to the teeth and bone through the periodontium, improper or insufficient oral hygiene can lead to gingival and periodontal disorders

d. A thin horizontal bony plate of the skull, located in the roof of the mouth, interaction with the tongue is essential in the formation of certain speech sounds

5. Which of the following statements best defines **pharynx**?
    a. Inner lining of the cheeks and lips. It is non-keratinized and is continuous with the mucosae of the soft palate, under surface of tongue and the floor of the mouth.
    b. A thin horizontal bony plate of the skull, located in the roof of the mouth, interaction with the tongue is essential in the formation of certain speech sounds
    c. The area situated immediately posterior to the mouth and nasal cavity, food and air can pass through, important for vocalization.
    d. Bean-shaped structures that are located throughout the body and are connected by a series of vessels similar to veins. It helps to filter out and destroy bacteria and toxic substances, but can also collect cancer cells that travel through the lymph vessels.

6. Which of the following pictures shows the **floor of the mouth**?
    a. This area includes examination of the filiform, fungiform and circumvallate papilla.
    b. This area includes examination of the free gingival, the cemento-enamel junction, the junctional epithelium and the alveolar mucosa.
    c. This area includes examination of the posterior pharyngeal wall, the anterior pharyngeal wall, the tonsilar crypt and uvula.
    d. This area includes examination of the sublingual folds, the whartons duct, the lingual side of the gingival and jawbones.

7. **Gingiva** is best defined as:
    a. bean-shaped structures that are located throughout the body and are connected by a series of vessels similar to veins. It helps to filter out and destroy bacteria and toxic substances, but can also collect cancer cells that travel through the lymph vessels.
    b. the area situated immediately posterior to the mouth and nasal cavity, food and air can pass through, important for vocalization.
    c. inner lining of the cheeks and lips. It is non-keratinized and is continuous with the mucosae of the soft palate, under surface of tongue and the floor of the mouth.
    d. the tissue surrounding the roots of the teeth and covering the jawbone, considered an extension of the skin, connected to the teeth and bone through the periodontium, improper or insufficient oral hygiene can lead to gingival and periodontal disorders

8. Which statement best defines **tongue**?
    a. The area situated immediately posterior to the mouth and nasal cavity, food and air can pass through, important for vocalization.
    b. Inner lining of the cheeks and lips. It is non-keratinized and is continuous with the mucosae of the soft palate, under surface of tongue and the floor of the mouth.
    c. The tissue surrounding the roots of the teeth and covering the jawbone, considered an extension of the skin, connected to the teeth and bone through the periodontium, improper or insufficient oral hygiene can lead to gingival and periodontal disorders
    d. The large bundle of muscles on the floor of the mouth that manipulates food for chewing and swallowing, one of the organs for taste, strongest muscle in the human body proportional to size

9. **Soft palate** is best defined as:
    a. a thin horizontal bony plate of the skull, located in the roof of the mouth, interaction with the tongue is essential in the formation of certain speech sounds
    b. the large bundle of muscles on the floor of the mouth that manipulates food for chewing and swallowing, one of the organs for taste, strongest muscle in the human body proportional to size
    c. the tissue surrounding the roots of the teeth and covering the jawbone, considered an extension of the skin, connected to the teeth and bone through the periodontium, improper or insufficient oral hygiene can lead to gingival and periodontal disorders
    d. the tissue comprising the back of the roof of the mouth, is movable, consisting of muscle fibers sheathed in mucous membrane, aids in swallowing and speech

10. Which statement best defines **hard palate**?
    a. The tissue surrounding the roots of the teeth and covering the jawbone, considered an extension of the skin, connected to the teeth and bone through the periodontium, improper or insufficient oral hygiene can lead to gingival and periodontal disorders
    b. Inner lining of the cheeks and lips. It is non-keratinized and is continuous with the mucosae of the soft palate, under surface of tongue and the floor of the mouth.
    c. A thin horizontal bony plate of the skull, located in the roof of the mouth, interaction with the tongue is essential in the formation of certain speech sounds
    d. The large bundle of muscles on the floor of the mouth that manipulates food for chewing and swallowing, one of the organs for taste, strongest muscle in the human body proportional to size

11. List the components that make-up the intraoral examination?
    a. _____
    b. _____
    c. _____
    d. _____
    e. _____
    f. _____

12. List all the components that make-up the extraoral and intraoral examination?
    a. _____
    b. _____
    c. _____
    d. _____
    e. _____
    f. _____
    g. _____
    h. _____

13. **Palpation** is defined as
    a. perceiving by sense of touch.
    b. beating of the heart.
    c. containing, forming, or discharging pus.
    d. pertaining to the amount of pressure when polishing.

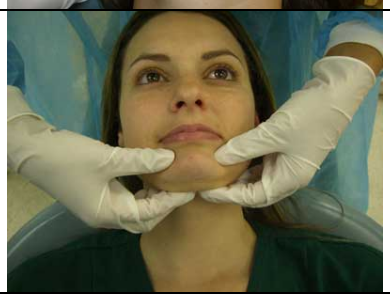
14. Which definition best defines **digital** palpation?
    a. Use of a single finger.
    b. Use of a finger and thumb of the same hand.
    c. Use of finger or fingers and a thumb from each hand applied simultaneously in coordination.
    d. Use of two hands at the same time to examine corresponding structures on opposite sides of the body.

15. Which statement best defines **bi-digital** palpation?
    a. Use of a single finger.
    b. Use of a finger and thumb of the same hand.
    c. Use of a finger or fingers and a thumb from each hand applied simultaneously in coordination.
    d. Use of two hands at the same time to examine corresponding structures on opposite sides of the body.

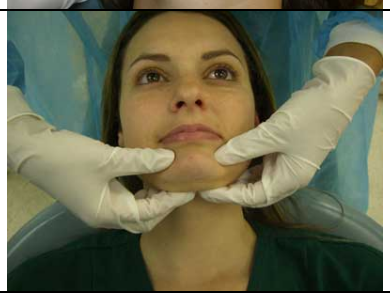
16. **Bi-lateral** palpation is defined as
    a. use of a single finger.
    b. use of a finger and thumb of the same hand.
    c. use of finger or fingers and a thumb from each hand applied simultaneously in coordination.
    d. use of two hands at the same time to examine corresponding structures on opposite sides of the body.

17. Which definition best defines **bi-manual** palpation?
    a. Use of a single finger.
    b. Use of a finger and thumb of the same hand.
    c. Use of finger or fingers and a thumb from each hand applied simultaneously in coordination.
    d. Use of two hands at the same time to examine corresponding structures on opposite sides of the body.

18. Which of the pictures below shows a **bi-digital** palpation technique?

A.		C.	
B.		D.	

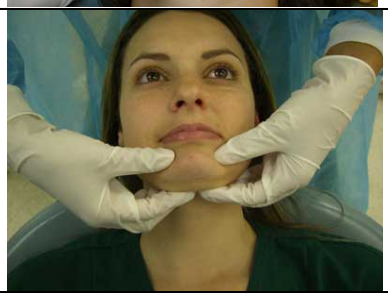
19. Which of the pictures below shows a **digital** palpation technique?

A.		C.	
B.		D.	

20. Which of the pictures below shows a **bi-lateral** palpation technique?

A.		C.	
B.		D.	

21. Which of the pictures below shows a **bi-manual** palpation technique?

A.		C.	
B.		D.	

Appendix H

Interview Questions

Interview Questions

1. What aspects of the module did you like best?
    a. Interactivity _____
    b. Video _____
    c. Sequence of Content _____
    d. Test questions _____
    e. Other _____

2. What aspects of the module did you like least?
    a. Interactivity _____
    b. Video _____
    c. Sequence of Content _____
    d. Test questions _____
    e. Other _____

3. What ways or things could help to improve the module?

4. How many times did you view the module and for how long?

Appendix I

Attitudinal Survey

Attitudinal Survey

I would like to thank you for taking the time in viewing and answering the test questions in the module. In addition, I would like to thank you for participating in the psychomotor skills assessment. At this time, I would like to know what you thought about the module and test questions or any other suggestions that you might have. Please be honest! This feedback will help to revise the module to make it a better self-instructional interactive multimedia module.

		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	Instructions					
1	The instructions were clear.					
2	The instructions were easy to understand.					
3	The instructional module was clear.					
4	The instructional module was easy to read.					
	Content and Layout					
3	The module was interesting.					
4	The module followed good sequence.					
5	The module contained too much information for one sitting.					
6	The module contained too much information in each section.					
7	The terms in the module were adequately defined.					
8	The module took too long to complete.					
9	The video clips adequately represented the topic.					
10	The video clips in each segment helped preview the next section of the module.					
11	The video clips were clear.					
12	The video clips were easy to see.					
13	The still pictures were clear.					
14	The still pictures were easy to see.					
15	The video clips helped increase my learning.					
16	The test questions were easy to understand.					
17	The video clips helped to answer the test questions.					

18	The module helped to systematically perform the head, neck and mouth examination.					
	Attitudinal					
19	The module will be useful to me as a dental hygiene student.					
20	The module increased my cognitive knowledge on oral cancer and how to perform the oral cancer examination.					
21	When I become a licensed dental hygienist, I will perform the examination on all patients on a routine basis.					

Additional Comments: