Evaluation of Resources for an Interactive Infection Control Instructional Program

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Abstract

Purpose: To evaluate educational resources used in developing and implementing an interactive infection control instructional program for first year (n=26) and second year (n=26) dental hygiene students in a baccalaureate program.

Methods: An educator's toolkit was used to develop online and interactive learning modalities for teaching infection control content. Descriptive statistics were used to evaluate responses on a post instruction opinion survey on a 5-point Likert-type scale.

Results: Following the instructional program, most students reported on an opinion survey that they understood infection control principles (92% first year, 100% second year), felt prepared to work safely in clinic (96% first year, 100% second year) and liked working at their own pace (88% first year, 100% second year). First year students valued the online learning components and were less favorable toward supplemental textbook readings and the limited time to complete all 10 modules. Most second year students valued the interactive workshop but did not take the time to complete the online videos and did not watch all of them. Seventy-nine percent of second year students (n=20) preferred the interactive workshop method over traditional lecture instruction completed during their first year.

Conclusion: This paper describes 1 institution's process of developing and implementing an infection control instructional program utilizing an educator's toolkit.

Keywords: blended-learning, dental hygiene education, infection control, dental education

This study supports the NDHRA priority area, **Professional Education and Development:** Validate and test measures that evaluate student critical thinking and decision-making skills.

Introduction

Demonstration of student competency in infection control is required by the American Dental Association Commission on Dental Accreditation (ADA CODA) for all dental, dental hygiene and other allied dental education programs.[1] This instructional program was designed to provide junior (first professional year) and senior (second professional year) students didactic support needed for clinical application and competency-based evaluation of infection control principles in a baccalaureate dental hygiene program.

Traditionally, dental hygiene students learn the didactic portion of infection control content via classroom instruction, and then they are expected to apply their knowledge in the clinical setting for delivering safe client care. Active learning strategies are necessary components for enhancing deep learning, synthesis of lecture course materials and critical thinking skills.[2] Synthesis of didactic course content requires taking what was learned in the classroom and then demonstrating or applying that information in the real world setting. Active learning happens through involvement and participation with others, and with thoughtful reflection.[3] Today's millennial learners have been characterized as "sheltered'" having difficulty taking risks and being high achievers, but lacking critical thinking skills.[4] Teachers must provide opportunities for students to interact with each other and critically reflect on their learning.[3] Interaction is considered a necessary component for students to become critical thinkers.

Blended learning (BL) approaches have been shown to be equally as effective as traditional approaches or to increase learning outcomes, motivation and student satisfaction,[5-8] and are defined as "thoughtful fusion of face-to-face and online learning."[3] BL is a combination of self-paced e-learning (web-based) activities and classroom learning with interaction.[2,9] Some institutions label a course "blended" if a certain percentage of the content is online, but there is no defined percentage of online content which constitutes blended learning.[4] Facts or items requiring memorization would be delivered best in a self-directed way (online), whereas other content is best taught in a traditional classroom setting (lab or clinical work). This project utilized some components of BL and was designed to be interactive (Table I).

Table I: Blended learning (BL) methodology for both groups

First-Year Students (Initial Instruction)(n=26)	Second-Year Students (Refresher Instruction) (n=26)
Attended mandatory orientation session	Orientation letter sent with instructions (three weeks prior to fall semester classes)
Completed 10 modules (first week of semester) [OSAP workbook reading, supplemental textbook reading, watched online videos, brief online quiz at the end of each module]	Completed 10 modules: online videos only (prior to workshop)
Attended (2) 1-hour classroom lecture sessions (first week of semester)	n/a
Attended 2-hour interactive workshop (end of first week of semester)	Attended 2-hour lecture/interactive workshop (end of second week of semester)
Examination & opinion survey at the end of the workshop	Examination & opinion survey at the end of the workshop

The purpose of this project was to evaluate educational resources used in a BL interactive infection control instructional program for first and second year dental hygiene students in a baccalaureate program. This paper describes 1 institution's process of developing and implementing this interactive infection control program.

Methods and Materials

Over the past several years at Idaho State University, a variety of methods have been used to teach infection control content (initial and refresher), such as traditional classroom instruction, e-learning and a BL method. Questions arose regarding which of these methods was effective in promoting critical thinking skills, preferred by students and saving time. Data previously collected and analyzed indicated course outcomes for e-learning and traditional classroom instruction in infection control was equally effective when free online modules were used.[10] This program evaluation was conducted to evaluate educational resources used in teaching infection control content and to describe 1 institution's process of implementing these resources. An exemption for this study was granted from the institution's Human Subjects Committee.

The course director utilized an educator's toolkit developed by the Organization for Safety, Asepsis, and Prevention (OSAP) (OSHA and CDC Guidelines: Interact Training System 3rd Edition-School Program) to enhance infection control instruction.[11] The toolkit was purchased for $300 and provided several resources to develop infection control curricula, including a CD-ROM with 10 video modules and a corresponding workbook, a sample course syllabus, sample test questions, charts, posters, checklists, suggested supplementary readings, and suggested interactive class activities. The toolkit was a helpful template for developing and implementing the redesigned instructional program which included some components of online learning and interactive activities for a BD approach.

Table I outlines the methods and timeline employed for each group. First-year students in the 2010 fall semester (n=26) had initial infection control instruction with the revised content developed from the OSAP toolkit. They attended a mandatory orientation session including instructions on accessing the online course materials on Moodle (an online teaching platform) and had an opportunity to ask questions. Students had 1 week to work through 10 online course modules, which included a combination of workbook and supplemental readings, online videos, and brief online post-module study questions.[12] The modules could be accessed as many times as the students desired, and they could email the course instructor if questions arose; however, none did. Students attended 2 classroom sessions lasting 1 hour each, which included lectures and interactive educational activities as suggested by the OSAP toolkit (a Glo-germ™ exercise and an informal experimentation with a range of personal protective equipment (PPE) checking fit and dexterity) during the first week of classes, and a 2 hour interactive workshop at the conclusion of the first week of classes. The workshop included a discussion, and interactive learning exercises, such as "What's wrong with this picture?" activities and case study scenarios provided in the OSAP kit and developed by the course instructor. At the conclusion of the workshop, students took a multiple-choice examination on the curricular content to demonstrate competency as required by ADA CODA. Examination results were not utilized as data in this program evaluation. Examination results were for student grading and competency purposes only. Students also completed an opinion questionnaire that was developed in collaboration with a statistician at this institution. Questionnaire items were

simply worded, stated in the positive, and geared toward undergraduate student's knowledge level. The survey items were not formally validated, but were designed to assess student's opinions of the educational resources that were used in teaching infection control content.

Second year students (n=26) completed their initial infection control instruction in the 2009 fall semester by a traditional classroom lecture method prior to the development of the new instructional program. These students were required to have annual refresher education in the fall semester 2010. Prior to the start of the academic year, the students received orientation letters including information on the required annual refresher. Instructions were provided on accessing and completing the online course content (10 video modules) which was required prior to the workshop scheduled 2 weeks after the start of the semester. Supplemental readings were not required for second year students. The students attended a required refresher workshop 2 weeks after the start of the semester, and the content was the same as the first year students (discussion and interactive activities). At the conclusion of the workshop, students took a multiple choice examination on the curricular content to demonstrate continued competency as required by ADA CODA. They also completed an opinion questionnaire.

Respondents were provided with an opportunity to comment on the most and least beneficial components of the infection control instructional program through 3 open-ended questions. Descriptive data analysis was performed on the opinion surveys. Qualitative thematic analysis of participants' comments identified predominant themes which emerged in response to the open-ended questions.

Results

Table II shows descriptive data (self-reported) for first year students (n=26). The vast majority of first year students (97%) did complete all of the assigned OSAP workbook readings. The students agreed or strongly agreed that the interactive workshop was easy to understand (88%) and useful for clinic (96%). First year students also agreed or strongly agreed that they understood infection control principles (92%), felt prepared to work safely in clinic (96%) and liked working at their own pace to learn infection control curricular content (88%). Only 75% watched all of the videos. This information was self-reported and was not confirmed via Moodle utilization. Open-ended comments indicated the online videos were valued by the students because they could work at their own pace and could watch the videos as many times as they wanted. The assigned readings, and particularly the supplemental textbook readings, were not well received because students perceived the information was "contradictory," "hard to understand," "unnecessary," "repetitive" and "a lot of work in a short period of time."

Descriptive data from the opinion survey items indicated that the majority of the second year students (n=26) disagreed or strongly disagreed that the online videos were quick to complete (73%), although only 12% viewed all of the videos (Table III). The majority of the second year students agreed or strongly agreed that the interactive workshop was easy to understand (96%), interesting (73%) and useful for clinic (96%). They also agreed or strongly agreed they understood infection control principles (100%), felt prepared to work safely in clinic (100%) and liked working at their own pace (100%). The majority (79%) preferred the new interactive method to the traditional instruction used the previous year for initial infection control training.

Comments and suggestions for improving the instructional program were made by both groups of students. First year students needed more time to complete the program and recommended eliminating the repetitive supplemental readings. They enjoyed being able to watch the online videos as many times as they desired. Second year students thought the most beneficial aspect was the interactive workshop and preferred this method of instruction over the traditional method employed in their first year. They commented it was a "good refresher." These students reported that they valued the interactive workshop exercises and learning activities because they could see the clinical relevance of these learning modalities. Most of the second year students (69%) did not watch all of the videos, whereas most of the first year students did (75%). These results might have been related to the fact that these students had seen the videos during initial infection control training, and/or possibly related to the nature of novice versus more experienced learners. Novice learners need detailed information and visual instructional approaches, and they are less able to apply principles in interactive case-based activities. More experienced learners, like the second year students, with the goal of attaining competence need application and synthesis for deeper meaningful learning.[13]

Discussion

Understanding the various aspects that worked or did not work for each group of students was important in evaluating this infection control program and

Table II: Descriptive Statistics of First-Year Students (Post-Instruction Opinion Survey)

Question	n	SA	A	N	D	SD
I found the online component (videos) easy to access and use.	27	16 59%	11 41%	0	0	0
I found the online component (videos) quick to complete.	27	6 22%	12 44%	6 22%	3 11%	0
I found the online component (videos) interesting.	27	1 4%	8 30%	14 52%	4 15%	0
I think the content of the online component (videos) will be useful for clinic.	27	4 15%	19 70%	3 11%	1 4%	0
I watched all of online videos.	27	15 56%	5 19%	1 4%	5 19%	1 4%
I found the OSAP workbook easy to read.	27	5 19%	9 33%	4 15%	6 22%	3 11%
I found the OSAP workbook quick to read.	27	1 4%	9 33%	7 26%	7 26%	3 11%
I found the OSAP workbook interesting to read.	27	0	11 41%	7 26%	9 33%	0
I think the OSAP workbook will be useful for clinic.	27	7 26%	13 48%	5 19%	2 7%	0
I completed all of OSAP workbook readings.	27	15 56%	11 41%	0	1 4%	0
I found the supplemental textbook readings easy to read.	26	4 15%	12 46%	7 27%	2 8%	1 4%
I found the supplemental textbook readings quick to read.	25	2 8%	5 20%	8 32%	8 32%	2 8%
I found the supplemental textbook readings interesting to read.	25	2 8%	9 36%	11 44%	2 8%	1 4%
I think the supplemental textbook readings will be useful for clinic.	25	3 12%	12 48%	7 28%	3 12%	0
I completed all of the supplemental textbook readings.	25	5 20%	10 40%	3 12%	6 24%	1 4%
I found the interactive workshop easy to understand.	25	11 44%	10 40%	4 16%	0	0
I found the interactive workshop interesting.	25	5 20%	12 48%	6 24%	2 8%	0
I think attending the interactive workshop will be useful for clinic.	25	12 48%	12 48%	1 4%	0	0
I understand infection control principles after completing this material.	26	13 50%	11 42%	1 4%	1 4%	0
I feel prepared to work safely in the clinic setting after completing this material.	26	11 42%	14 54%	1 4%	0	0
I liked being able to work at my own pace.	26	17 65%	6 23%	3 12%	0	0

Likert Scale Used: 1=Strongly Agree (SA), 2=Agree (A), 3=Neutral (N), 4=Disagree (D), 5=Strongly Disagree (SD)

has helped to target content and activities specific to each group of learners. The aspects that worked well for the first year students receiving initial infection control content included the OSAP workbook and online videos which could be watched as many times as the student desired. The interactive workshop with activities was most valuable to the second year students receiving refresher infection control content for application and synthesis. They clearly preferred the new interactive method of instruction.

Table III: Descriptive Statistics of Second-Year Students (Post-Instruction Opinion Survey)

Question	n	SA	A	N	D	SD
I found the online component (videos) easy to access and use.	26	4 15%	15 58%	3 12%	3 12%	1 4%
I found the online component (videos) quick to complete.	26	0	1 4%	6 23%	13 50%	6 23%
I found the online component (videos) interesting.	26	1 4%	6 23%	14 54%	3 12%	2 8%
I think the content of the online component (videos) will be useful for clinic.	26	2 8%	18 69%	4 15%	1 4%	1 4%
I watched all of online videos.	26	1 4%	2 8%	5 19%	12 46%	6 23%
I found the interactive workshop easy to understand.	26	14 54%	11 42%	1 4%	0	0
I found the interactive workshop interesting.	26	5 19%	14 54%	7 27%	0	0
I think attending the interactive workshop will be useful for clinic.	26	13 50%	12 46%	1 4%	0	0
I understand infection control principles after completing this material.	26	13 50%	13 50%	0	0	0
I feel prepared to work safely in the clinic setting after completing this material.	26	16 61%	10 39%	0	0	0
I liked being able to work at my own pace.	25	11 44%	14 56%	0	0	0
As a first-year student last year, I understood the infection control material and felt prepared for clinic.	26	12 46%	11 42%	2 8%	1 4%	0
Which method would you prefer if you had a choice in learning initial infection control material?	24	*Traditional Method 5 21%		*New Method 19 79%		

*New Method consisted of workbook reading, online activities, supplemental readings, and interactive workshop
*Traditional Method consisted of workbook reading and lecture
Likert Scale Used: 1=Strongly Agree (SA), 2=Agree (A), 3=Neutral (N), 4=Disagree (D), 5=Strongly Disagree (SD)

These aspects have been retained in the instructional program for both groups. The aspects that did not work well included supplemental readings for first year students, and the online videos for second year students. Subsequently, these aspects have been deleted from the instructional program.

The OSAP educators' toolkit provided a useful framework for development and implementation of this revised infection control instructional program and allowed face-to-face classroom time for interactive learning strategies. Class activities as suggested from the toolkit, examination items and online preparatory components may be helpful to faculty responsible for teaching infection control content to dental hygiene students. OSAP also has a variety of infection control resources available at no charge for both educators and practitioners who are not seeking continuing education credits.[14] OSAP's free online modules "Ask Lily - From Policy to Practice: OSAP's Interactive Guide to the CDC Guidelines" are useful for teaching students, training staff and refreshing infection control knowledge during annual updates required by OSHA.[14] An examination covering these modules worth 10 hours of continuing education credit can be completed for a $100 fee for non-members and $85 for OSAP members for those individuals desiring credits for re-licensure. These materials have the potential to assist educators in teaching and evaluating infection control curricular content.

Conclusion

Data from this program evaluation suggests the use of OSAP educational resources was a helpful template in redesigning the infection control curriculum at this institution. Dental hygiene educa-

tors could use these resources to develop blended learning instruction, as well as interactive and critical thinking activities necessary for today's students. The use of supplemental readings should be minimized as they may provide little benefit for students. Recommendations for dental hygiene educators that teach infection control content include:

- Review available resources from OSAP
- Minimize supplemental readings
- Provide adequate time for students to complete the course materials
- Include hands-on, practical "real life" activities with clinical relevance

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Acknowledgment

The author would like to thank Professor Denise Bowen for her assistance with manuscript preparation, Dr. Teri Peterson for her assistance with statistical analysis, and the dental hygiene students at Idaho State University for their participation in this project.

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