Abstract:

**Learning Outcome:** To increase awareness among dietetics educators regarding use of computer assisted instruction (CAI), to teach nutrition focused physical examination (NFPE) in pre-professional dietetics education program curricula.

**Background:** NFPE is not consistently integrated into pre-professional dietetic education program curricula. Reasons for this include lack of availability of trained faculty and inconsistent approaches to NFPE education and training curricula. Consequently, many RDNs do not have the knowledge and skills to conduct, train, or mentor students/interns on NFPE. CAI is an alternative and accessible approach to NFPE education and training.

**Methods:** To test the feasibility of using CAI for NFPE instruction, students in a Coordinated Program (CP) online Nutrition Assessment course completed a CAI on NFPE. Live virtual and multi-media presentations, asynchronous discussion forums, and case-based learning activities were included. At the final live virtual session students conducted a NFPE on a partner as faculty assessed skill development. A pre-test and two post-tests were administered to assess knowledge change and retention.

**Results:** All (n=42) CP students successfully demonstrated NFPE skills covered in the CAI. Evaluations from the spring 2015 semester revealed 89% of students recommended this mode of learning, and 94% thought the live demonstrations better enabled them to conduct NFPE at a novice level. Students reported that the accessibility of NFPE demonstration recordings were invaluable for independent NFPE practice. The module reached geographically diverse students with a consistent approach to NFPE training and education.

**Conclusions:** CAI can advance NFPE education and training for students. Instruction and practice can occur at the learner’s pace and videos can be viewed multiple times. Students found this encouraged repeated skills practice which they thought enhanced skill acquisition. CAI allows for more flexibility, eliminates travel time, is accessible from any location, and is a potential cost savings.

**Goals:** The primary aim of this innovation was to provide a method of multi-media CAI education and training of NFPE skills for Rutgers University’s School of Health Professions pre-professional students enrolled in a Bachelor’s level CP. We sought to determine if the NFPE module was a feasible method of virtual instruction for pre-professional students. A second aim was to explore changes in knowledge scores and acquisition of skill development of CP students after completion of the on-line NFPE module.

**Scope:** Our team has utilized this innovation with nutrition/dietetics pre-professional students enrolled in the CP over the past two academic years. Students completed an on-line NFPE module titled “The Nuts and Bolts of NFPE for Dietetics Practice” as a component of their undergraduate Nutritional Assessment course. This NFPE module was incorporated into our Dietetic Internship curriculum in 2016-17. Instructional topics and material within this CAI can be reproduced to reach pre-professional dietetics and nutrition students both nationally and internationally for education and training on entry-level NFPE. The materials and course content has the potential to also be used for training RDNs who lack this knowledge and skill.

**Methods:** The innovation is a multi-media CAI NFPE module, which is housed in Moodle, a virtual learning platform. The module content consists of audio and video presentations, related reading materials, case studies, and asynchronous discussion forums. The Moodle platform includes a link to a virtual classroom where live educational sessions on NFPE and simulated practice assessment of NFPE skills are conducted. All live sessions are recorded and posted in the learning platform for unlimited viewing. An example NFPE video and a stepwise guide to conducting NFPE are available for students to practice NFPE skills.
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One week prior to starting the module, students complete a pre-test to assess baseline knowledge of NFPE. Immediately following the pre-test a six-week virtual instruction on NFPE begins. Specific module educational content is described below:

1. Week one: The NFPE module and introduction to NFPE is reviewed during a live virtual class. Educational topics include an introduction and tour of the learning platform Moodle, and introduction to NFPE.
2. Week two: Educational topics include the identification and documentation of adult malnutrition. Students are assigned to groups and answer questions on screening, assessment, and malnutrition identification in an asynchronous discussion forum.
3. Week three: Educational topics include assessment of fat and muscle wasting, and functional status. Students are assigned to groups and answer questions in an asynchronous discussion forum.
4. Week four: During a live virtual class faculty demonstrate intra-oral, extra-oral, and dysphagia screening. Faculty lead students through a stepwise approach to NFPE.
5. Week five: Students lead a live virtual class discussion on the identification and documentation of malnutrition using group case studies. The etiology, severity, and classification of malnutrition are identified using a rubric designed for the NFPE module.
6. Week six: During a live virtual class students conduct a live NFPE on a non-participant volunteer. A time limit of eight minutes is enforced. Faculty evaluate student performance and provide feedback after the session. All students view a recording of the live session and complete self-evaluations of their own performance. Supplies students require for the session are: gloves, tongue depressor, Q-tip, cotton 2x2 and a penlight.

At the completion of the NFPE module, students complete a post-test to assess changes in knowledge. Six weeks later, a second post-test is administered to assess retention of knowledge. Once all knowledge tests are completed module evaluations are administered to obtain student feedback.

Evaluation of Results: The innovation was evaluated using quantitative and qualitative measures of assessment. Changes in knowledge were assessed with a pre and post-test design. A 48 multiple-choice question (MCQ) test was administered at baseline and at module completion during the spring 2015 semester. The subsequent spring 2016 semester, a second 48 MCQ post-test was added six weeks after the initial post-test to examine retention of knowledge. The content source areas of the test questions included the identical topics covered in the module: identification and documentation of malnutrition, assessment of fat and muscle wasting, functional status, extra and intra oral examinations and dysphagia screening. The acquisition of skill development was evaluated by faculty using a stepwise guide to NFPE as an assessment rubric. After completion of the final post-test, students complete an evaluation of the NFPE module.

Results/Outcomes: During the spring 2015 semester 22 CP students were enrolled in the NFPE module. Ninety-five percent (95.5%, n=21) of students completed both the pre- and post-tests. There was a significant increase in students’ mean score from pre-test (mean = 29.2 ± SD of 4.47, range = 22.0-36.0) to post-test (mean = 39.6 ± SD =3.08, range = 33.0-45.0) (p<0.001). All (100%, n=22) students were able to demonstrate the skills covered in the NFPE module.

In the spring 2016 semester 20 CP students were enrolled in the NFPE module. Ninety percent (90.0%, n=18) completed all three MCQ knowledge tests. Significant increases were found in students’ mean
knowledge score from pre-test (mean =30.0 ± SD of 4.72, range = 20.0-37.0) to first post-test (mean = 38.7 ± SD =4.24, range = 30.0-46.0) and to the second post-test (mean = 40.67 ± SD =4.45, range = 34.0-48.0) (p<0.001). All (100%, n=20) students were to successfully demonstrate the NFPE.

Over the two academic years the NFPE module has been in use, we continuously evaluated the NFPE module for process improvement. In 2015 we determined using CAI to teach NFPE was feasible to teach NFPE to CP students as the knowledge scores significantly improved, and, students provided positive feedback about the mode of instruction. However our team thought knowledge retention was also important to study, thus we wanted to examine whether students could retain the knowledge 6-weeks after completing the module. Therefore, in the spring of 2016 we added the second post-test to assess knowledge retention. Minor changes were made to module content and we re-organized the content to be covered in 6 weeks from 8 weeks.

Overall, the outcome evaluation reveals that 42 CP students at Rutgers University enrolled and completed all educational portions of the CAI module during the spring 2015 and spring 2016 semesters. Students thought the accessibility of NFPE demonstration recordings were invaluable for independent NFPE practice. They found being able to watch other classmates conduct the exam during the live session, and then again using the recording of the virtual session helped them reflect upon how they can improve their own technique and skill.

As of fall 2016, our team expanded the use of this CAI NFPE module beyond our CP to our Dietetic Internship Program. Seventeen dietetic interns completed the NFPE module in the fall 2016 semester as a part of the curriculum, however that data have not been analyzed nor included in these results. Currently 22 CP students are enrolled in the module for the spring 2017 semester. We have expanded our use of the module to two international cohorts, with pre-professional students at Tel Hai College in Israel, and, currently with nutrition and dietetics faculty at International Medical University in Malaysia. This latter group has enrolled with the anticipation that they will subsequently have us teach the module to their pre-professional students.

Benefits/Effectiveness: This CAI NFPE module provides a method of virtual instruction to teach the knowledge and skills of NFPE to pre-professional students. Outcomes data reveal that use of this CAI NFPE module significantly increased knowledge and enhanced skills acquisition of NFPE by students enrolled in the module. Integration of a CAI NFPE module into pre-professional program curricula can increase NFPE conduct by students, who, ultimately will be dietitians. Although we’ve not tested it with practicing dietitians, this CAI NFPE module may also be used to train entry-level, and experienced RDNs in practice. If utilized for continuing professional education and training on NFPE it may result in increased use of NFPE of RDNs. The CAI NFPE module is flexible and convenient, and eliminates the need to travel, which will also substantially reduce costs. The replication of this CAI NFPE module can adapt to any on-line learning platform, and/or virtual classroom. Once the content is created, it is sustainable; revisions and updates will need to occur based on new evidence and guidelines for practice. This CAI NFPE module can be modified to encompass a programs’ niche or specific goals and objectives.