ENRICHMENT OF THE SCIENCE CURRICULUM WITH THE INTRODUCTION OF A DIET EVALUATION ASSESSMENT TASK BASED ON A REAL-LIFE SITUATION

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ABSTRACT

An assessment task based on a real life situation was introduced as a part of the curriculum in the Diet and Nutrition course at Victoria University. This core unit was offered to second year Biomedical Sciences and Nutritional Therapy students in the School of Biomedical and Health Sciences. The students were required to assess their own dietary intake and energy expenditure over a seven-day period, and compare their nutritional status with the national recommendations outlined by the NHMRC. The primary aims of this assessment task were to enhance the students' understanding of nutrition and energy balance, and improve the quality of learning experience and in turn the learning outcomes. Furthermore, this assessment task provided an opportunity for students to develop their data analysis, problem solving and communication skills. Students believed the assessment task was useful, and their knowledge about nutrition and communication skills had improved through the completion of assignment.

INTRODUCTION

It has been reported that students can have a low interest in science course due to the difficulties they experience during the learning process (Bransford, Brown and Cocking, 2000). The lack of understanding of important scientific perspectives could have serious consequences (Jacobson, Richards, Kennedy-Clark, Thompson, Taylor, Hu, Taylor, & Kartiko, 2010). Although no single solution can address the multitude of cognitive, pedagogical, and social factors that contribute to the decline of students' interest, and the overall low level of understanding of science, several studies suggested that there is potential to address these issues. Strategies include the educational use of advanced technology, mode of information delivery, and strategically designed assessment tasks (Jacobson et al., 2010; CSHE, 2011). Many reports have focused on student assessments in the tertiary education environment in Australia and elsewhere (James, McInnis, & Devlin, 2002; CSHE, 2011). Depending on the student cohorts and learning objectives, educators will face different challenges when developing meaningful student assessment tasks. Sé and colleagues (2008) suggested that students learn more effectively if the knowledge and skills they acquire are inserted and contextualized in relevant real-life, problem-based situations.

As part of the Bachelor of Science (Biomedical Sciences and Nutritional Therapy) degree programs at Victoria University, students undertake one semester of Diet and Nutrition unit in their second year of these programs. The objectives of these programs are: that the graduates possess critical thinking and writing skills, problem solving skills, life-long and independent learning skills; and that they can compete in both local and global environment. In order to enhance the learning experience of these science students and improve the learning outcomes, an assessment task was developed to emphasize interactive learning through a real life situation. In 2010 students completed the Diet Evaluation assessment task based on their own dietary intake and physical activities for the duration of seven days. They were required to provide detailed analyses of the nutritional values of their dietary intake and the energy expenditure on various types of activities they performed over that period of time. It was expected that this practical approach would provide an opportunity for students to integrate the information learned in the classroom to real life situations. In addition, their data analysis, problem solving and communication skills would be improved through the completion of this assignment.

METHODS

The study was approved by the Human Research Ethics Committee of Victoria University (HRETH 10/53). All students (96) were provided with the "Requirements for Diet Evaluation assessment task" (see Table 1 for details). They were encouraged to use the classroom materials, reference books, online database from government organizations, computer software (*Foodworks*) and research papers in completing this assignment. A workshop was also conducted to provide guidance for students.

Table 1: Requirements for Diet Evaluation assessment task
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RBM2260 Diet and Nutrition – Diet Evaluation Assignment

Please follow the instructions carefully.
1. Your assignment should be approximately 2000 words.

2. Your work must include the record of your food and beverage intake and activities performed over a consecutive seven-day period. The amount/volume of all food and beverage items, as well as the preparation methods should be included.

3. You must include the analysis of the nutrient content of your average daily intake, and the daily energy expenditure.

4. You must also include the evaluation of your average dietary intake in relation to the macronutrients and your energy balance status.

5. You are also required to discuss the possible health effects and other related issues based on your daily intake and energy balance status.

6. Your assignment must be well structured and include an introduction, results and discussion sections.
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The Diet Evaluation assignment was marked out of 10 using the criteria given in Table 2, which focus on the five aspects: data analysis, discussion, presentation, quality of writing and referencing.

Table 2: Assessment criteria for Diet Evaluation assignment (10%)

Marks	Section	Contents
1	General Presentation and Referencing	Neat Well structured and easy to follow Grammar and spelling are of a professional standard throughout References are included in the text and as a list at the end of report
1	Introduction	Concise, clearly stated
4	Results	Presentation clear ALL results ALL calculations Further manipulation of data (graphs, tables, statistics, etc.)
4	Discussion	Discussion and interpretation of results with reference to supporting literature i.e. where did you get your answers and ideas from. I thought this was putting your results in context of what is already known in the literature? Further extension of results e.g. implications on health or other broader issues. This was not clearly stated in the assignment instructions and I am still not clear what the students need to do to complete this part of the assignment.

In addition, an opinion survey was conducted to students after the completion of the Diet Evaluation assignment following the methods previously published by Hryciw (2009). The aims of the survey were to determine the usefulness of the assessment task, and its perceived relevance to their course and future careers. There were ten closed items with a rating scale from 1 to 5 (Appendix 1), and the following question: "Any additional comments about the Diet Evaluation assignment". The details of the rating scale were: 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree, N/A = Not applicable. To ensure the validity of the survey, the closed items included a mix of questions that were worded affirmatively or negatively.

RESULTS

A total of ninety six students enrolled in the diet and nutrition course completed the diet evaluation assessment in semester 1, 2010. The age of the students ranged from 19-37 years with 64% of the respondents being female. The average mark for the assignment was 8 (±1.4) out of 10. Fifty one students (53%) returned the opinion survey. This comprised 38 students enrolled in the Biomedical Sciences degree program, 10 students enrolled in the Nutritional Therapy degree program and three students enrolled in Health Education degree program. 78.4% of students that completed the survey were females and 25.5% indicated that English was their second language. Table 3 summarizes students' responses to closed survey questions regarding the diet evaluation assessment task. Data were analyzed by using the nonparametric Wilcoxon signed-rank test (details of questions are shown in Appendix 1).

Table 3: Student response to questions on opinion survey (n = 51)

Question	Mean	Median	Interquartile range
1. Knowledge about nutrition has improved	4.1	4**	1
2. The usefulness of this task	4.0	4**	2
3. An valuable learning experience	5.0	5**	0
4. Task was **NOT** useful for future career	2.7	2*	2
5. Instructions were clear	4.2	4**	1
6. Did **NOT** understand the instructions	1.8	2**	1
7. Preference for assignment to test	4.3	4**	2
8. The task was boring	2.6	2*	1
9. Communication ability has improved	4.3	4*	2
10. Communication skill is important	4.0	4**	1.5

*$P < 0.05$, **$P < 0.01$ based on the difference in median values from the scale point of 3 (neither agree nor disagree) using the nonparametric Wilcoxon signed-rank test.

In general, the results of opinion survey indicated that most students believed that the diet evaluation assignment was useful and provided a valuable learning experience. Most students reported that their knowledge about nutrition had improved after the completion of the assignment (median = 4, $P < 0.01$). In addition students strongly supported the inclusion of this assessment item instead of a test (median 4, $p < 0.05$). Most students believed it is important for science students to be able to communicate to the public and they believed that the Diet Evaluation assignment helped them develop the communication skills (median = 4, $P < 0.05$). Students also disagreed that the assignment was boring and not useful for their futures careers (median = 2, $P < 0.01$).

All students responded on ten questions and no survey was deemed invalid (all responses marked as "3"). Most students disagreed that they did not understand the instructions for the completion of the

assignment (median = 2, $P < 0.01$) but agreed that the instructions for the task were clear (median = 4, $P < 0.01$).

Additionally, students have written several positive comments about this assessment task such as, "This assignment was a great idea. It helped me understand the concepts on nutrition and energy balance much better, and enable me to apply the knowledge into the real life".

DISCUSSION

James et al. (2002) discussed five distinct yet inter-related assessment challenges that are applicable to both large and small classes. These include: (a) the need to avoid assessment that encourages shallow learning, (b) provision of high quality individual feedback, (c) ensuring a fair assessment to all students, (d) staff workload in assessing students, and (e) avoiding plagiarism. The indicators of effective assessment in higher education suggested by CSHE (2011) include: the capacity to analyse and synthesis new information and concepts rather than simply recall information previously presented; a variety of assessment methods employed so that the limitations of particular methods are minimised; and assessment tasks designed to assess relevant generic skills as well as subject-specific knowledge and skills. The introduction of the Diet Evaluation assessment task to the science students enrolled in the Biomedical Sciences and Nutritional Therapy degree courses aimed to encourage critical enquiry and interactive learning through a real life situation. It was clear, from the quality of work submitted, that students have developed the data analysis, critical thinking and problem solving skills through the completion of this assessment.

The outcomes based on students' opinion survey on the Diet Evaluation assignment showed the positive responses. The data demonstrated that the task stimulated student engagement which in turn may foster improved learning as students were enthusiastic about this assessment and its practical application in the real life. The improvement of knowledge and better understanding about nutrition, as well as communication skills enhanced the achievement of objectives for these undergraduate programs. Jones (2009) suggested that science students should be trained in and ready to apply the scientific method in their professional lives. The Diet Evaluation assessment task provides an opportunity for students to integrate their knowledge with a real life situation, and prepare the students for professional lives.

Students enrolled in the Biomedical Sciences and Nutritional Therapy degree courses come from various ethical groups with a higher proportion of students from a non-English speaking background. Conventional classroom learning about the basics in nutrition could be difficult for some of these students. However these students can do well when they are placed in the environment that they can associate the theory with a real life situation. It is encouraging to know that most of students reported that their knowledge about nutrition has improved after the completion of Diet Evaluation assignment. This would have contributed to the overall positive learning outcomes of the course. In addition, it enabled students to make the healthy choice for both foods and life style in the future. Lifestyle and diet are widely recognized in the prevention and treatment of several chronic diseases including obesity, diabetes, cardiovascular disease and many cancers (NHMRC 2003). A better understanding and knowledge of nutrition and awareness of healthy diet and lifestyle could reduce significantly the risks of developing these diseases in the late life.

Communication is an essential skill in the workplace. But there were limited opportunities to develop communication skills in the existing BSc (Biomedical Sciences and Nutritional Therapy) programs at Victoria University. Diet Evaluation assessment has helped students develop communication skills. Further to the present study, it would be useful to investigate whether this assessment task has improved the communication skills of these students in their following year of study at the University, or in their employment after graduation. This evidence will further investigate the usefulness of this assessment task.

There are limitations from the opinion survey presented in this paper. Although surveys are an appropriate tool to investigate student engagement with the task, student perceptions do not provide direct evidence of learning outcomes and may not be well-correlated with outcomes as suggested by Bowman (2011).

In conclusion, the Diet Evaluation assessment task based on the real life situation is a valuable teaching and learning tool. It enriched the second year curriculum of the Bachelor of Science (Biomedical

Sciences and Nutritional Therapy). Students gained a better understanding of diet and nutrition through the completion of this assignment, and their communication skill has also been improved.

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APPENDIX 1

STUDENT FEEDBACK SURVEY (*Your opinion about the Diet Evaluation assessment)*

This survey is for research purposes. It is anonymous and completion is voluntary.

Sex: M   /   F
Age:
Full time or part time student: FT   /   PT
Degree course: Biomedical Sciences   /   Nutritional Therapy / Others
English as a second language: Y   /   N
International student: Y   /   N

PLEASE READ CAREFULLY and circle ONE number from 1-5.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
(1) After completing the Diet Evaluation Assessment task, I believe that my knowledge about nutrition has improved	5	4	3	2	1
(2) I understand the usefulness of this task	5	4	3	2	1
(3) This exercise provided me with a valuable learning experience	5	4	3	2	1
(4) I did **NOT** think that completing this Assessment Task was useful for my future career	5	4	3	2	1
(5) The instructions for this task were clear	5	4	3	2	1
(6) I did **NOT** understand the instructions for the assignment	5	4	3	2	1
(7) I prefer this assignment over a test	5	4	3	2	1
(8) I found this task boring	5	4	3	2	1
(9) After completing the diet evaluation assignment, I believe that my ability to communicate has improved	5	4	3	2	1
(10) I believe it is important for students to be able to communicate to the public	5	4	3	2	1