

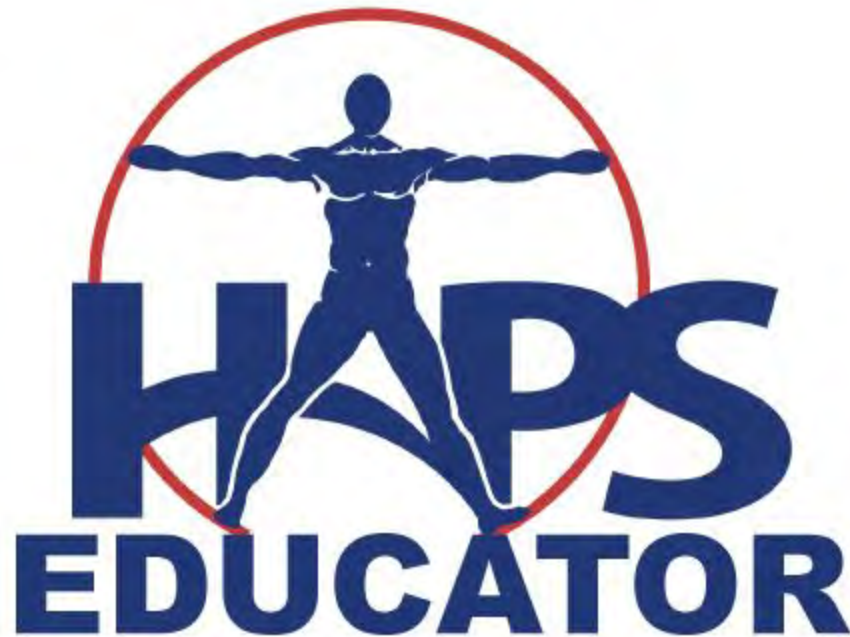
**Students Work in Groups to Create and Peer-Evaluate
Newsletters Pertaining to Current Health-Related Topics**

Jacqueline Carnegie and Joanne Savory

Corresponding Author: jcarnegi@uottawa.ca

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Students Work in Groups to Create and Peer-Evaluate Newsletters Pertaining to Current Health-Related Topics

Jacqueline Carnegie, PhD, MEd*, Joanne Savory, PhD

Department of Cellular & Molecular Medicine, University of Ottawa, Ottawa, ON

jcarnegi@uottawa.ca, joanne.savory@uottawa.ca

* Corresponding Author

Abstract

A challenge with large undergraduate classes is the provision of opportunities for students to construct educational documents and to obtain individualized feedback pertaining to their work. Being able to work as part of a group, to clearly express information both orally and in writing, and to self-reflect while providing constructive feedback are soft skills that are valued by employers in the healthcare professions. We describe a two-part assignment in which students first worked in small groups to construct an informative newsletter pertaining to either the gut microbiome or one of four assigned fad diets and then evaluated a newsletter created by a group of their peers. Survey data revealed that most students found the assignments valuable learning exercises and that the opportunity to evaluate a newsletter created by their peers was welcomed. These assignments provide a way for students studying anatomy and physiology to reflect on what they have learned in class and, through self-directed research, apply their new knowledge in a way that will serve them well once out in the workplace.

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Key words: assignment, communication, soft skills, peer-evaluation, large classes, health sciences

Introduction

We have previously reported the use of creative online assignments to encourage the development of communication skills in nursing students studying anatomy and physiology. These initial assignments asked each of them to apply their newly acquired understanding of the immune system to the creation of an informative vaccination brochure targeting the general public (Savory and Carnegie 2019). In the current paper, we describe steps we have taken over the past three years to modify and extend these assignments so that students can explore other timely health-related topics while gaining additional experience associated with working in small groups to create their final product. We have also incorporated an opportunity to learn from the work of others in their class through the process of rubric-guided peer evaluation.

Often categorized as “soft skills” (Ray and Overman 2014), the development of strong oral and written communication skills is important for nursing students and other healthcare workers and should be encouraged wherever possible as they proceed through their undergraduate studies (Andre and Graves 2013; Feltham and Krahn 2016). Once Bachelor of Science in Nursing (BScN) graduates are in the workplace, this communication can take different forms. Orally, it can be the provision of clear and understandable explanations to patients regarding their healthcare, but it may also involve discussions among a team of healthcare professionals as they collaborate to meet all aspects of patient care (American Nurses Association 2010; Schwartz et al. 2019; Suter et al. 2009). Written communication can vary from keeping concise and accurate records of the vital signs and disease symptoms of hospital patients to the

more complex demands of developing patient-targeted public health documents pertaining to illnesses and their management.

Studies have shown that group work, a form of active learning used at all levels of education, can enable learning, promote social interaction, and provide students with important collaborative skills, including conflict management, that will serve them well once they are out in the workplace (Burke 2011; Chiriac 2014; Murphy et al. 2005). For example, by providing a forum for discussion, group work has been shown to facilitate learning and foster the development of higher level critical thinking abilities as students interact with one another to share ideas, ask questions, and problem-solve while planning their finished product (Blowers 2010; Chiriac 2014; Gillies and Boyle 2011; Koh and Hill 2009). It has also been suggested that working as part of a group can provide extra motivation for engagement leading to higher levels of satisfaction with the task at hand and improved academic achievement compared to completing a project alone (Burke 2011; Chiriac 2014; Gillies 2003). Finally, an important recruitment asset valued by many employers, including those in the field of healthcare, is the ability to work as part of a team (Babiker 2014; Brennan et al. 2021; Chapman et al. 2006; Wu et al. 2014).

While group work often occurs in a face-to-face environment, a special case of group work occurs online. In this instance, because students connect with one another electronically via their course learning platform, they can have different

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geographical locations, even live in different time zones, while still sharing ideas and reflecting on their assigned project. Studies looking specifically at online group work have proposed that in-depth processing and understanding of information and critical thinking occur in response to idea sharing and reflection as the students plan their approach to the assignment (Koh and Hill 2009; Wright and Lawson 2005). While the asynchronous nature of interactions that occur online has the potential to slow progress in planning, it also has the benefit of promoting reflection by allowing students to take time to think and organize their thoughts before responding to their peers (Koh and Hill 2009; Petrides 2002; Vonderwell 2003). Finally, student-student online interactions within the confines of assignment-associated small groups can foster a sense of community to help ground first-year students as they embark on distance learning within large undergraduate classes (Wright and Lawson 2005).

Peer assessment is an important component of active learning that is increasingly used to provide opportunities for students to develop valuable soft skills that are transferable to the workplace (Adachi et al. 2018; Li et al. 2016). These include the abilities to evaluate the qualities and accuracy of completed product, to think critically as they link what they are assessing with their own understanding of the topic, and to communicate clearly when providing constructive feedback to fellow students in the form of written justifications of assigned assessment scores (Adachi et al. 2018; Reinholz 2016).

This paper describes two types of newsletter assignments in which students began by collaborating online within small groups to create a product and finished by assessing a newsletter created by a group of their peers. The benefits of this constructive learning approach are discussed along with adjustments made to assignment design in response to student feedback. Challenges associated with managing the various aspects of the newsletter assignments in the context of large classes of undergraduate students are also addressed.

Methods

Gut Biome Newsletter Assignment Part 1: Newsletter Creation

This assignment was first given to students enrolled in two different sections of the same A&P course, ANP1107A (n = 291) and ANP1107B (n = 253) during the winter term of 2019. ANP1107 (Human Anatomy and Physiology III) is a 3-credit course that targets the endocrine regulation of metabolism and body temperature as well as the anatomy and physiology of the digestive, immune, renal, and reproductive systems. Approximately 50% of each class was composed of nursing students with most of the remaining students registered in other health science and medical science programs. Prerequisites for these programs include grade 12 biology and chemistry and the majority of students would also have completed ANP1105, an introductory ANP course that includes such topics as body tissues and the regulation of homeostasis by the autonomic nervous and endocrine systems. In this course, the first body system to be addressed is the digestive

system and students were given the assignment only after the digestive system had been completely covered in lecture so that they would have an appropriate knowledge base upon which to build as they wrote their newsletter articles.

Within Brightspace (the learning management system [LMS] used by the University of Ottawa), students were randomly assigned to 5-member newsletter creation groups, with each group having its own private discussion folder. Students were provided with a list of suggested topics they could include in their two-page newsletter (Table 1) and given complete freedom to decide which member of their group would be the editor and to allocate among themselves (including the editor) the topics they would address with their newsletter. Students were given guidance as to maximum suggested word length per article (200 words), minimum font size (11 pt.), and the targeted audience (lay public – for example this could be a brochure available in their family doctor's office) for their newsletter.

- *A letter from the editor providing basic background information about gut microbiome, their importance, how the populations have changed over time, even a couple of fun facts or introducing probiotics*
- *News flash update with educational details about something very new pertaining to the gut microbiome*
- *Gut biome and weight management*
- *Gut biome and gut sensitivity*
- *Gut bacteria and overuse of antibiotics*
- *Gut biome and food allergies*
- *Gut biome and the brain*
- *Fecal transplants*
- *Effect of diet on gut microbiome populations*

Table 1. Suggested Possible Subtopics for Gut Biome Newsletter from which Each Author could Choose.

The editor was responsible for setting a deadline for receipt of newsletter contributions, incorporating all article submissions into a 2-page newsletter in which each author's contribution was linked with their name and student number, and removing any repetition between individual submissions in order to create a streamlined final product. Supportive illustrations, with appropriate citation, could be used as deemed necessary, and editors were encouraged to use formatting that would create an engaging and interest-grabbing document. Finally, editors were responsible for submitting their group's assignment (newsletter plus a separate page with the authors' references) within the Brightspace assignment folder by the due date. Students were given 4 weeks between the date of assignment posting and the deadline for newsletter submission.

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Gut Biome Newsletter Assignment Part 2: Peer Assessment

Following receipt of the newsletters, each instructor (J. Carnegie for ANP1107A and J. Savory for ANP1107B) then prepared them for anonymous peer review. The newsletters were redacted to remove all student names and numbers and resaved under a modified heading so that each one could then be sent via the private, small-group discussion folders to a different group for peer assessment.

Students were provided with a rubric (Table 2) to guide the completion of their peer reviews. In addition to scoring (fractions permitted) for four newsletter criteria (ability to engage the reader, accuracy, educational value, and overall impression), students were asked to briefly defend each score with a sentence or two of justification. The rubric also included two open-ended questions where they could highlight what they liked about the newsletter and indicate suggestions for improvement.

The editors were not required to provide a peer review, but, rather, were responsible for collating the reviews completed by the other group members into a single document to be submitted by the deadline. Students had 2 weeks to complete all steps of the peer assessment portion of the assignment.

Each student earned up to 4% of their final grade during the newsletter creation part of the project and a further 1% by completing a thoughtful peer assessment. Using the assignment grading function of Brightspace and guided by the same rubric provided to students to conduct their peer assessments, the authors provided each group with a score plus constructive feedback that addressed the strengths and weaknesses of each newsletter component (or the editorial work) and a separate grade with feedback for the peer assessments.

Fad Diet Newsletter Assignment Part 1: Newsletter Creation

This new assignment replaced the gut biome assignment for students enrolled in ANP1107A (n = 370) and ANP1107B (n = 278) during the winter term of 2021. Again, approximately 50% of students were enrolled in the BScN program with most of the other students studying in related fields linked to medical and health sciences. While many aspects of the assignment were the same, some important modifications were made to the design in response to survey feedback collected from students who completed the gut biome newsletter assignment two years prior. For this assignment, students were randomly divided into groups of six and each group was assigned one of four fad diets (Table 3) for their newsletter that was, again, to be directed toward the lay public.

NAME:		STUDENT NUMBER:
Evaluation Criterion	Score (3)	Justification of score given
Ability to grab attention & maintain interest		
Accuracy of information presented		
Educational value		
Overall impression		
What I really liked		
Suggestions for improvement		

Table 2. Rubric used by Students for Peer Review of Gut Biome and Fad Diet Newsletters.

Fad Diet (Assigned by Group Number)	Newsletter Subtopics
<p>Keto Diet</p> <p>Gluten-Free Diet (when you don't have Celiac Disease)</p> <p>Intermittent Fasting</p> <p>Paleo Diet</p>	<ol style="list-style-type: none"> 1. Fad diets – why are they now so popular? What are some of the reasons why people are trying them? 2. A brief description of your assigned fad diet and what it promises. 3. The physiology behind your fad diet – does the physiology support the diet claims? 4. Identify important nutrients that might be lacking in your assigned fad diet. Suggest how those deficiencies should be handled. 5. Does your fad diet offer any other benefits besides weight loss? How likely is long-term adherence to the fad diet? Why or why not?

Table 3. Assigned Fad Diets and Fad Diet Newsletter Subtopics

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Groups were given freedom to choose their editor and the assigned subtopic (Table 3) that each of the remaining five group members would tackle with their submissions. For this assignment, editors were not required to write an article; their sole duty was to compile the finished product. Newsletter authors worked with the same suggested word length and maximum font size but were also provided with two firm due dates set by the instructors, rather than the editors. The first was the date by which they had to check in with their group to participate in task allocation so that the project could move forward and the second was the date by which they had to deliver their completed articles to the editor in order to ensure inclusion in the newsletter. The peer review process and the overall grading of newsletters and peer reviews were handled exactly as for the gut biome newsletter assignment.

HAPS Learning Outcomes

With regard to HAPS Learning Outcomes, the gut microbiome newsletter assignment builds on the A&P Digestive System Learning Outcome, Module N: 12.5: "Describe the role of bacteria (microbiome) in digestion." The fad diet newsletter assignment links to several A&P Nutrients and Metabolism Learning Outcomes from Module O, including:

- 1.1 Define nutrient, essential nutrient, and non-essential nutrient.
- 1.2 Describe common uses in the body for carbohydrates, fats and proteins.
- 2.1 Define metabolism, anabolism, and catabolism, and provide examples of anabolic and catabolic reactions.
- 3.6 Compare and contrast carbohydrate, fat, and protein metabolism in the fed (absorptive) and fasted (post-absorptive) states.

Collection of Student Survey Data

At the end of the course, feedback was collected anonymously using a questionnaire composed of eight 5-point Likert-based questions plus two open-ended questions allowing students to identify what they liked or did not like about the assignment. Each survey also included a final, open-ended question directed at only the editors to collect feedback about their unique experiences. The Likert-based questions explored student perceptions regarding the learning value of the assignment (including opportunities for creativity and development of communication skills), the clarity of the instructions, and their attitudes toward group work and peer assessment.

In 2021, two of the Likert-based questions were modified to explore the ability of group work to promote welcome interactions with peers during a time of pandemic-induced

studying in isolation as well as to collect student feedback about evaluating a newsletter about a fad diet that was different than the diet explored by their group. In 2019, students in both ANP1107A and ANP1107B were provided with the survey as a single page document with the option to complete it, if they chose to do so, at the time that they were writing their final exam. In 2021, given the pandemic and the complexities associated with the move to online learning, students in ANP1107A, only, were provided with the anonymous survey via Brightspace once the course had finished and, again, they were assured that survey completion was voluntary and anonymous. This project was approved by the University of Ottawa Human Ethics Committee (File number H09-06-10B).

Results

Even though the newsletter assignment, in total, represented only 5% of each student's final grade, the participation rate was high for students in both sections of ANP1107 for both newsletter topics (Table 4). Out of a total of 544 students in 2019 and 648 students in 2021, 95-98% participated in newsletter creation, either as an author or an editor, and 92-96% completed the peer review portion of the assignment. The quality of the work was also good, with average scores (out of 4) for each newsletter ranging between 3.51 and 3.60 and, in part 2, very close to perfect for thoughtful completion of the peer-evaluation rubric (Table 5).

The justification comments provided by students indicated that many of them put considerable thought into the scores that they assigned to newsletters created by their peers. For example, a score of 2 out of 3 for educational value of a newsletter was justified with the explanation: "the information was valuable and educational, however, some sentences lacked clarity and would be difficult to understand for the selected audience (general public)." And a perfect score of 3 for accuracy for another newsletter was supported by: "the information was very accurate in describing what a paleo diet entails and how it can affect one's health. Looking at the references you can see that the information was pulled from peer reviewed and other reputable sources (Stats Canada)." Finally, a perfect score of 3 for the ability to grab and maintain interest for a peer's newsletter on intermittent fasting was justified by: "the initial appearance of the newsletter is visually appealing. The information flows well, making it easy to stay on track and follow the flow of the newsletter keeping the reader intrigued. The facts and points are clear cut."

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Year	Number of Students	ANP1107A		Number of Students	ANP1107B	
		Newsletter Creation	Peer Review		Newsletter Creation	Peer Review
2019	291	283 (97.3%)	273 (93.8%)	253	246 (97.2%)	243 (96.0%)
2021	370	363 (98.1%)	349 (94.3%)	278	265 (95.3%)	257 (92.4%)

Table 4. Participation in Newsletter Creation and Peer Evaluation

Year	ANP1107A		ANP1107B	
	Newsletter	Review	Newsletter	Review
2019	3.51 ± 0.16	1.00 ± 0.00	3.58 (±0.22)	0.99 (± 0.02)
2021	3.60 ± 0.14	0.99 ± 0.04	3.58 (±0.23)	0.97 (± 0.05)

Table 5. Average Scores ± SD for Newsletters (out of 4) and Peer Reviews (out of 1).

The response rate for the paper-based survey conducted in 2019 was 81.8% (both classes combined). Feedback revealed that the majority of students attributed significant learning value to their participation in the gut biome newsletter assignment. Between 68 and 78% of respondents agreed or strongly agreed that the assignment gave them an opportunity to conduct self-directed learning that improved their knowledge and understanding of a topic

that was a natural extension of course content and almost 60% acknowledged that the nature of the assignment provided them with important practice in written communication (Figure 1A). The majority of students also found the instructions to be clearly worded (75%) and enjoyed participating in both newsletter creation (53%) and the review of a newsletter created by their peers (57%; Figure 1B).

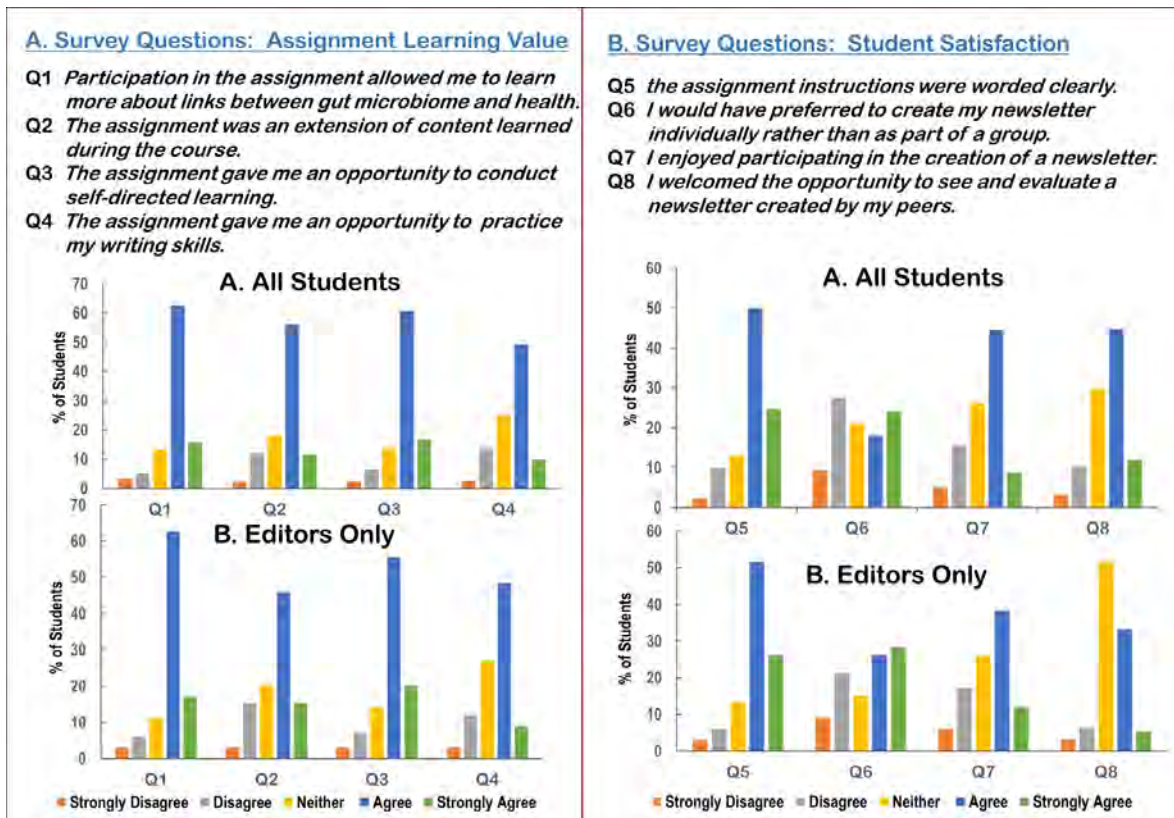


Figure 1.
 A. Survey Feedback from ANP1107 Students regarding Learning Value of Gut Microbiome Newsletter Assignment (n=445).
 B. Survey Feedback from ANP1107 Students Pertaining to Level of Satisfaction with Aspects of Gut Microbiome Newsletter Assignment (n=445).

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Not all students welcomed the group work. 42% of respondents indicated that they would have preferred to work individually on the project (Figure 1B) and a comment in reply to the open-ended question regarding ways to improve the assignment was a request to allow students to self-sort themselves into groups rather than being randomly assigned. Key words that frequently appeared in student responses to the question “what I liked best about this assignment” included: creativity, interesting, effective, artistic, in-depth learning, and self-directed learning. While editors also mentioned that they welcomed the chance to be creative, they did find the editorial tasks labor-intensive and did not enjoy having to set deadlines and chase after group members who did not respect them.

In 2021, the response rate for the online survey administered to ANP1107A students was 37.3% (138 respondents in a class of 370 students). Between 76 and 86% of students found the fad diet assignment to have learning value and 76% agreed or strongly agreed that it provided opportunities for practicing their writing skills. 96% of respondents found the instructions to be clearly worded.

66% of respondents agreed or strongly agreed that the creation of a newsletter pertaining to a particular fad diet provided a welcome opportunity to interact virtually with their peers during newsletter creation and 78% found it interesting to peer review a newsletter about a fad diet that was different from the fad diet explored by their group. Creativity and the opportunity to do something different were common themes in student responses to the open-ended question of what they liked about the assignment, but several also identified the opportunity to work with other students while studying off-campus as a bonus. Two examples of such comments are: “[I liked] interacting with others in the class when that’s not so easily done now”, and “It was a nice way to meet new people in class virtually!” Of the 32 survey respondents who were editors, most of them indicated that the opportunity to create a final product based on submissions from their peers was an enjoyable experience and only three mentioned having issues with one or more of the group members not submitting their articles on time. Representative comments from editors include: “Peers were all cooperative and nice to work with in my group and met deadlines which made my job simple” and “I personally love proofreading assignments and being creative, so I thought that this assignment was amazing.”

Discussion

The majority of anatomy and physiology students surveyed in this study welcomed the opportunity to work together in small groups to create informative, health-related newsletters about the gut microbiome or an assigned fad diet. An important first consideration for this project was the mechanism of group creation. When dealing with large classes where the instructor does not know each student individually, groups can be created either by random assignment or by self-selection. Each method has its advantages and disadvantages. Self-selection

may foster the creation of groups whose members are already acquainted with one another and so feel comfortable within the group setting, communicate well amongst themselves right from the beginning, and are able to complete projects with few within-group conflicts (Chapman et al. 2006). At the same time, self-selection may present an uncomfortable hurdle for some first-year students in large classes who have not yet established themselves within a network of peers and, therefore, feel sidelined and excluded by the self-selection process (Bacon et al. 2001).

On the other hand, random assignment can be done efficiently and easily using an LMS, has the potential to maximize group heterogeneity, is perceived as being fair to all participants, and is reflection of what students will often encounter once out in the workplace (Bacon et al. 2001; Blowers 2003; Burke 2011). While random assignment does risk creating some groups that simply do not work well together, it minimizes chances that groups will be formed that consist of a core subset of friends working together at the exclusion of one or two members of that same group who are not part of that social network – a risk when groups are formed by self-selection (Bacon et al. 2001). Given the large sizes of our classes and, most recently, the inability of students to meet in person and form friendships, we used random assignment to groups for all newsletter assignments. However, students within each group did have complete independence in determining who their editor would be and in identifying specific subtopics that each member would address.

Group assignments must be developed carefully so that communication within each group is facilitated and the instructions provided to students are clear and complete, allowing all members to have a thorough understanding of their roles and responsibilities (Burke 2011; Chiriac 2014). We provided private discussion folders for each group, so that the members could meet online and plan. Students were also free, once connections had been established within the discussion folders, to move to alternate social platforms, as long as all members were informed and in agreement to use that particular forum.

Feedback received in 2019 pointed to the importance of facilitating the role of the editor by having the instructor be the person to set all dates and deadlines, not just the date for submission of the final product. This included the date by which all group members should check in to establish their presence and meet the other group members and the date by which group members had to submit their articles to the editor. All students were advised that it was not the editor’s responsibility to chase after group members who were not staying on task; if their submission was not received on time, it would simply not be included in the final product. This revised approach was adopted in 2021 in order to minimize stress to those students who embraced editorial responsibilities and to reassure the remaining group members that the assessment of their efforts would not be jeopardized by a noncompliant student (Chiriac 2014).

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In addition to facilitating in-depth learning and critical thinking, the social aspects of group work must be recognized, especially during a pandemic when students are studying in isolation. Groups allow students to develop a sense of belonging and to gain deeper insight, not only into how to be accountable while working cooperatively with other members of the team, but also into how their actions are perceived by those same team members (Burke 2011; Chiriac 2014; Falls et al. 2014). In our study, two-thirds of the 2021 survey respondents agreed that the assignment provided a welcome opportunity for interaction with their peers, an additional benefit over and above the self-directed learning that was accomplished during research for each newsletter article.

The act of being a peer assessor and providing an evaluation is an important formative assessment tool that encourages self-reflection as students compare their own work with that completed by their peers and problem solve during the provision of constructive feedback directed toward assignment improvement (Cho and MacArthur 2011; Lu and Law 2012). It is important to provide peer assessors with a scoring rubric so that students have guidance as to what parameters (optimally 3-6) should be considered while completing their evaluation (Adachi et al. 2018; Wolf and Stevens 2007). The rubric used in this study (Table 2) asked students not only to score the newsletters with regard to four criteria: accuracy, educational value, ability to engage the reader, and overall impression, but also to provide written justification of their scores, to identify strong points, and to make constructive suggestions for newsletter improvement. This is in agreement with the study of Lu and Law (2012) who showed that greater educational value is associated with the written aspect of peer evaluation – the provision of thoughtful and constructive comments – compared to the simple act of assessing a particular project and assigning numeric scores with no written justification of the score given or provision of suggestions for improvement.

There was an important limitation to this project, due primarily to time constraints imposed by the different steps in assignment completion. Students had to learn some course content first, so that they would have a knowledge foundation for newsletter research and writing (and for both projects this was course content learned 4-5 weeks into the course). They then had to be given at least one month to create their newsletter articles (authors) and incorporate the submissions into a polished final product (editors). Another 2 weeks were required for the instructors to prepare the newsletters for peer review and allow for the assessments to be completed, compiled and submitted and a further 1-2 weeks were needed for instructors to grade and provide individualized feedback for each newsletter and peer review. This meant that by the time all aspects of the newsletter project had been completed, the course was close to finishing and students were focussing on preparing for final exams. Hence, there was really no time left to share all of the newsletters with the class as a whole so that they could benefit from seeing more than just two

newsletters: the newsletter they had created as a group plus the newsletter that their group had peer evaluated.

In summary, the creation of newsletters targeting a current health-related topic provides students with important opportunities to practice soft skills such as oral and written communication as well as working cooperatively as part of a group. These are skills that are valued by potential employers and will serve graduates well once they are in the workplace. Furthermore, students embraced these assignments, welcomed the opportunity to do self-directed learning and to be creative, and agreed that these assignments were a natural extension of content learned in their A&P course.

About the Authors

Jacqueline Carnegie, PhD, MEd, is an Associate Professor in the Department of Cellular and Molecular Medicine at the University of Ottawa. She teaches anatomy, physiology and pathophysiology to undergraduate students in the Faculties of Medicine, Health Sciences and Science. Her research focuses on developing learning and self-testing tools for these student populations.

Joanne Savory, PhD, is an Assistant Professor in the Department of Cellular and Molecular Medicine at the University of Ottawa. She teaches anatomy, physiology and pathophysiology to undergraduate students in the Faculties of Health Sciences and Science and embryology to students in the undergraduate medical education program.

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