

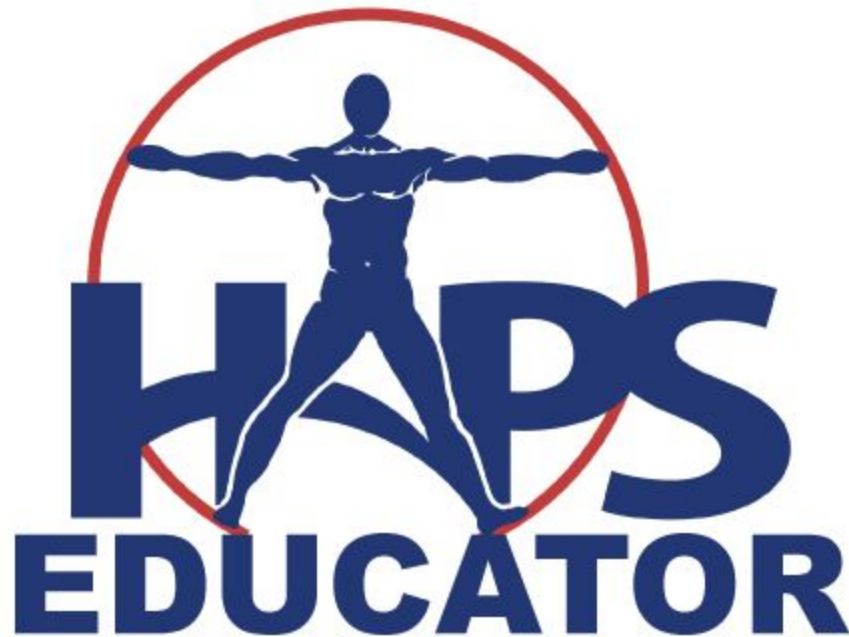
Vaccination Assignment: Anatomy and Physiology Students Practice their Communication Skills by Developing a Pro-Vaccination Brochure Targeting the General Public

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Vaccination Assignment: Anatomy and Physiology Students Practice their Communication Skills by Developing a Pro-Vaccination Brochure Targeting the General Public

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Abstract

Health sciences students need strong communication skills so that they can engage patients, explain concepts and justify medical procedures. For 3% of their final mark, 547 students studying the anatomy and physiology of the immune system were assigned the creation of a one-page brochure to help parents understand the importance and mechanism of childhood vaccination. Students were provided with a list of possible topics (e.g. how vaccines promote active immunity, why childhood vaccination is important, the link between herd immunity and community protection) and asked to explain the physiological bases of those concepts in layman's terms. Student participation approached 100% and assignment scores averaged 85.0 – 87.6%. Feedback provided to students addressed information quality and accuracy as well as the use of colour, illustrations, and appropriate text to engage readers and convey ideas. Timely provision of feedback to large classes was facilitated by the assignment function of the course learning management system. <https://doi.org/10.21692/haps.2019.009>

Key words: assignment, communication, soft skills, vaccination, feedback, large classes

Introduction

In addition to a strong foundation in basic sciences such as anatomy, physiology and pathophysiology, healthcare professionals need to develop effective communication skills that will allow them to actively engage with patients, clearly explain concepts related to illness and their treatment, and justify the need for various clinical procedures and medications (American Nurses Association 2010; Schwartz et al. 2019). Be it oral or written, in both instances communication can be defined as delivering critical information in a clear and concise manner (Doherty et al. 2016). While often classified as a “soft” skill (Ray and Overman 2014), communication is nonetheless also recognized by others as core competency that is of paramount importance to collaborative, error-free patient care (Suter et al. 2009). With regard to writing skills, research has shown that nursing students often have gaps in their writing abilities, and that BScN programs should include opportunities to address those gaps in an effort to promote career progression in the years after graduation (Andre and Graves 2013; Feltham and Krahn 2016).

Classic research pertaining to postsecondary education has shown that adults learn best when they can take responsibility for learning that is exploratory and task-oriented in nature rather than via passive attendance at lectures (Knowles et al. 1984; Pratt 1993). Indeed, while traditional approaches with large undergraduate classes have involved the provision of didactic lectures followed by assessment of student learning via multiple-choice-question-based examinations, this approach is not generally viewed as fostering significant

long term knowledge retention (Roberts 2011). On the other hand, a number of studies have shown that students who construct their own explanations develop a deeper understanding of important concepts and display improved knowledge retention (Rivard and Straw 2000; Michael 2006). In recognition of these characteristics of adult learners, curricula pertaining to the healthcare professions are often being updated to place increased emphasis on the use of self-reflective approaches that allow students to make connections between theoretical concepts and clinical practice (Bouchaud et al. 2017; DeLenardo et al. 2019).

When encouraging self-directed learning, a concern for educators in the digital age is the wealth of resources available to students with a simple click of the mouse. Rather than jumping from online link to online link and skimming documents to quickly pull out pieces of information, students need to develop deep reading strategies that allow them to critically assess the quality and validity of the information obtained as well as the reliability of their sources (Wolf and Barzillai 2009). Simply said, they need to acquire information literacy (Beck et al. 2012). An assignment that includes individualized feedback addressing the accuracy and completeness of students' written work can help them develop their research and critical thinking skills. That being said, the logistics associated with efficient and timely provision of that feedback, especially when teaching large undergraduate classes, can definitely pose a challenge.

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In this paper we describe the provision of a vaccination-based creative writing assignment to first-year health science students studying the anatomy and physiology of various body systems including the immune system. The learning opportunities linked to this assignment will be described in addition to the effective use of the assignment feature of learning management systems to facilitate assignment evaluation and the efficient provision of individualized instructive feedback.

Methods

Two undergraduate classes in anatomy and physiology, ANP1107A (271 students) and ANP1107B (276 students) participated in the study. This project was approved by the University of Ottawa Human Ethics Committee (File number H09-06-10B). Between 55 and 65% of each class was composed of first-year candidates in the BScN program taking this course during their second term of study. The remaining students were distributed primarily among other health science and science curricula (Table 1). At the time of beginning their assignment, these students had already completed the immune system segment of the course (three hours of instruction).

Table 1. Class composition, according to program, for each of the two sections of ANP1107.

PROGRAM	ANP1107A (%)*	ANP1107B (%)*
Nursing	64.6	54.7
Other Health Sciences Programs	26.9	23.6
Faculty of Science Programs	6.3	18.1
Programs within Other Faculties	2.2	3.6
TOTAL	100	100

*n = 271 (ANP1107A) and 276 (ANP1107B)

For 3% of their final grade, students were asked to create a one-page brochure targeting the general public in order to provide educational information pertaining to vaccination, how it works, why it should be done, and against what diseases children can be vaccinated (Figure 1). They were given six weeks to complete the assignment. While students were provided with a list of possible subtitles to include, they were also encouraged to construct their brochure as they thought best, and were given complete freedom to design the brochure layout, including the possible use of supportive illustrations. Within the assignment instructions (Figure 1), students were also informed of the criteria comprising the marking rubric that would be used for assignment assessment. Finally, they were instructed to save the finished product as a PDF file and to submit it via the assignment function of Brightspace®.



Imagine that you are working at a health clinic and have been asked to develop an engaging, one-page brochure to help clients reluctant to have their children vaccinated better understand vaccines and how they work. You are restricted to one page for this assignment that can be laid out however you feel it will be most effective (2 columns, colour, illustrations, etc.). The font used for this one-page document cannot be smaller than 10 and it must be laid out in such a way that it:

- Grabs attention
- Presents physiological ideas pertaining to the immune system that are accurate, use the right terminology and would be understandable to the lay public
- Helps someone who may not know much about vaccines better understand how they work and why they are important.

Below are a list of suggested subtitles that you can include in your brochure. You don't need to include all of them, but you do need to link your ideas together and tell a good story. The title for your brochure is up to you.

1. What is a vaccine and how does it work?
2. Why do breastfed babies have temporary immunity against common diseases?
3. For what childhood illnesses are vaccines commonly given and why?
4. Why should you consider getting your child vaccinated?
5. Herd immunity – how it works.

Submission Instructions

Save your one-page brochure as a pdf. This is essential and the **only** way in which it can be submitted. Please submit within this assignment web page by attaching your brochure pdf document. The assignment is due by March 30, 10 PM but can be submitted at any time.

Marking Rubric

- Quality and accuracy of information (1.5 mark)
- Conciseness of presentation of ideas and ability to grab attention and keep me reading (1 mark)
- Overall layout, use of colour, illustrations, etc. to convey ideas (0.5 mark)

Figure 1. Vaccination assignment instructions provided to students, including the marking rubric.

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Assignment evaluation was carried out by J. Carnegie (ANP1107A) and J. Savory (ANP1107B). When grading the assignments, it was easy to navigate from one document to the next within the vaccination assignment submission folder of Brightspace and to enter instructive feedback (three to six sentences/assignment) addressing both the strengths of each brochure as well as suggesting areas of possible improvement. After entering a final score out of three, a single click of the "Publish" button sent the score and feedback directly to the student while simultaneously linking these outcomes with the student's name in Gradebook.

Results

Even though assignment completion counted for only 3% of their final grade, participation rates approached 100% for students enrolled in each of the two sections of ANP1107 (Table 2). Furthermore, submission quality suggested that many students worked hard to create documents that were original, engaging, and informative (Figure 2). While plagiarism can sometimes be difficult to recognize, our overall impression was that it was infrequent (less than 3%) and isolated to only a portion of the document in those isolated instances. Whenever found, it was addressed immediately in the feedback to the student and the assignment score reduced

appropriately. Students were creative in their use of colour and selection of supportive illustrations, brochure layouts were eye-catching, and information was often presented concisely and accurately. Indeed, about 10% of brochures created by the two student populations were deemed to be of excellent quality; they were so well done that we were hard pressed to come up with suggestions for improvement. Overall assignment averages were 85.0 ± 1.9 and 87.6 ± 0.8 for ANP1107A and ANP1107B, respectively (Table 2), and only three of the 527 students participating in the assignment scored lower than 50% (one student in ANP1107A and 2 students in ANP1107B).

Table 2. Participation rates and assignment outcomes by course section.

Vaccination Assignment Outcomes	ANP1107A	ANP1107B
Participation (%)	97.8	94.9
Mean Assignment Score (%)	85.0 ± 1.93	87.6 ± 0.76
Range of Assignment Scores (%)	16.7 - 100	33.3 - 100
Overall Mean Final Grade (%)	70.0 ± 0.81	72.4 ± 0.78

n = 271 (ANP1107A) and 276 (ANP1107B)

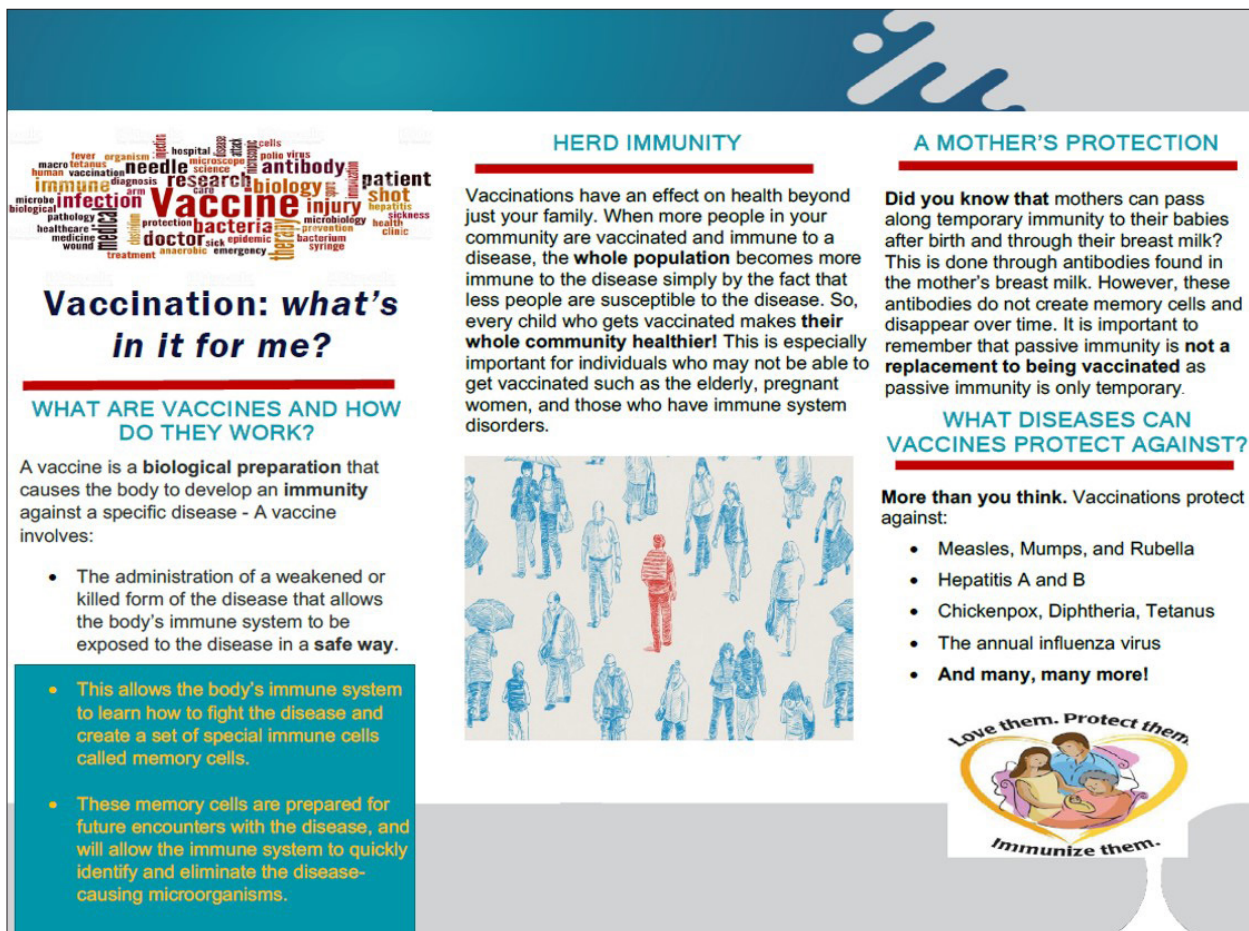


Figure 2. Example of a vaccination brochure that was well done.

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Assignment evaluation allowed common student misconceptions to be identified and addressed. Close to 40% of students did not mention the creation of memory cells as a result of vaccination. Some students assigned cellular functions to antibodies, even proposing that antibodies were responsible for immunological memory or were capable of becoming cells, and others had to be cautioned to not personalize vaccines by assigning teaching or thinking roles to them. Approximately 15% of students prepared documents that were too brief and contained insufficient educational content, while 7-8% pitched their educational information at a level that would be too high and too terminology-dense for the general public.

Discussion

The fact that each student prepared a vaccination brochure that then needed to be evaluated may raise the concern for instructors of large classes that the provision of individualized feedback to almost 300 students presented an overwhelmingly daunting task. However assignment viewing, the ability to type comments within the assignment function of Brightspace, and immediately send both grade and feedback directly to each student greatly improved the efficiency of this process. With regard to other learning management systems, our prior experience with Blackboard Learn[®] (also equipped with similar assignment-facilitating features) suggests that one important benefit to the use of today's learning management systems is that they allow us to provide large-enrolment classes with many of the same learning experiences (opportunities to create written work and receive timely feedback) that are offered to students in smaller classes.

Motivation and communication

Motivation is a key driving force behind student engagement (Lapum and St-Amant 2016; McDaniel and Tornwall 2016). We suggest that the high level of student participation observed in the present study was driven by both forms of motivation, intrinsic and extrinsic. With regard to *intrinsic* motivation, it is the learning itself that functions as a reward to encourage continued effort, while with *extrinsic* motivation, there is an external reward, over and above improved learning, that entices students to engage (Paas et al. 2003; Lapum and St-Amant 2016; Mennenga et al. 2016).

In the current study, the extrinsic motivation was simply the 3% of final grade to be achieved through the development of a product of reasonable quality and educational value. The intrinsic motivation may have been the opportunity to consolidate their understanding of aspects of immune system function by applying that new knowledge through the creation of an educational brochure geared toward the general public. This is a skill that has the potential to serve nurses well once they are out in the workplace and it was hoped that students would see the value in participating in such a profession-related exercise.

Furthermore, the suggested topics that students were encouraged to address when developing their brochures (Figure 1) target several HAPS A & P II learning outcomes at the comprehensive, analysis and application levels pertaining to the immunity and, specifically, the adaptive immune system. Those learning outcomes include being able to distinguish between the primary and secondary immune response, being able to distinguish between active and passive immunity, and using vaccination as a means of stimulating the development of active immunity in order to prevent disease. Studies have suggested that students will participate in learning activities if they can link them to course content, the potential for improved summative outcomes, and/or the acquisition of skills viewed as valuable for their chosen profession (Doherty et al. 2016; Pentaraki and Burkholder 2017). With those goals in mind, the assignment was constructed in order to give students practice in explaining the application of course-related immunological concepts in their own words, developing concise explanations that would fit within a defined space, and using their creativity to present educational information in an engaging manner.

Communication skills were a focus of the assessment rubric in that 50% of the final score was allocated to the ability of the brochure to grab and maintain attention, present information concisely, and package that information in an engaging manner by making effective use of language, colour, and illustrations. Feedback provided to each student not only corrected content errors, but also recognized communication strategies that were particularly effective, and made suggestions for language or layout that could be improved. As a final note, it is worth mentioning that one of the authors (J. Savory) received the following email from a student in ANP1107B in the months after the completion of the course: "The doctor in my neighbourhood is currently using my vaccination assignment as an easy-to-understand flyer in his clinic, which would never have been possible without your course!". What a terrific, unsolicited piece of evidence linking online learning activities to applicability in the workplace.

Deep Learning

Deep learning has been suggested to involve four sequential steps: (1) experience, (2) reflection, (3) abstract conceptualization, and (4) active experimentation or testing (Kolb 1981, Young 2018). Each step uses different areas of the brain and completion of all four steps has been suggested to be necessary for deep learning to truly occur (Zull 2002; Roberts 2011). With regard to the vaccination assignment, most students have experienced both being vaccinated and learning the theory behind vaccination during ANP1107 lectures (step 1). They needed to reflect on what they understood about vaccines (step 2), e.g. how they work and how they confer long term immunological memory, as they planned the layout of their brochure, the information to be included and the order in which that information would be introduced and explained (step 3). Finally, they assembled

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and submitted final products and awaited feedback from a content expert on the success of their endeavors (step 4). An interesting extension of this project would be to compare the depth of understanding and long-term (three to six months) retention of concepts pertaining to vaccination, herd immunity, and the acquisition of immunological memory between students who had developed vaccination brochures and students who did not have the opportunity to engage in this applied activity.

Limitations

The scheduling of course content imposed some limitations on this study that made it impossible to use it to its full potential. Presently, the immune system is taught approximately halfway through the course and it made no sense to have students begin their assignment until after learning immunology fundamentals. The necessity to provide students with sufficient time to research and construct their documents meant that they did not submit them until after writing their second midterm exam. This meant that summative evaluation of their knowledge and understanding of the immune system took place *before* they submitted and received feedback on their vaccination assignments. Reception of that feedback, especially with regard to the correction of misconceptions, would have been helpful prior to summative assessment.

A staged assignment in which there is some back-and-forth communication between instructor and brochure creator has the potential to further enrich the learning experience of students as well as keeping them on track with assignment milestones. In theory, the six weeks provided to students for assignment completion should have allowed for some interim assessment and feedback. However, while even one round of feedback partway through the assignment may have allowed timely correction of misconceptions and ensured that students were taking enough time to not only collect, but also analyze and apply their understanding of immunological concepts, the sizes of our classes and our teaching workloads simply did not permit this additional level of communication with students. In the future, we could explore the involvement of a number of graduate students to provide teaching assistance so that interim feedback could be provided quickly and support students while working on their projects.

Finally, the timing of assignment submission combined with the many hours required to grade and provide individualized feedback for almost 300 submissions meant that the course had finished by the time this had been completed. That final scheduling challenge meant that it was not possible to allow students to see and further learn from examples of excellent brochures prepared by their peers. It might be worthwhile to reorganize the content in this course so that the immune system is the first topic to be covered and then saved to be a topic assessed in the second rather than the first midterm exam. That would allow earlier submission of completed assignments and access to feedback before summative

evaluation. It would also facilitate the sharing of brochures among members of the class so that they learn, not only from the creation of their own documents, but also by seeing, possibly even peer-assessing, examples of creative thinking used by their colleagues.

Concluding remarks

The creation of informative vaccination brochures provided an opportunity for students to apply new knowledge pertaining to the immune system in a clinical application. Students gained practice in explaining concepts in their own words and the assignment function of Brightspace facilitated the provision of individualized instructive feedback to classes with large enrollments. The applied nature of the assignment provided students with experience that should serve them well once they are working in the field of healthcare.

Acknowledgement

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