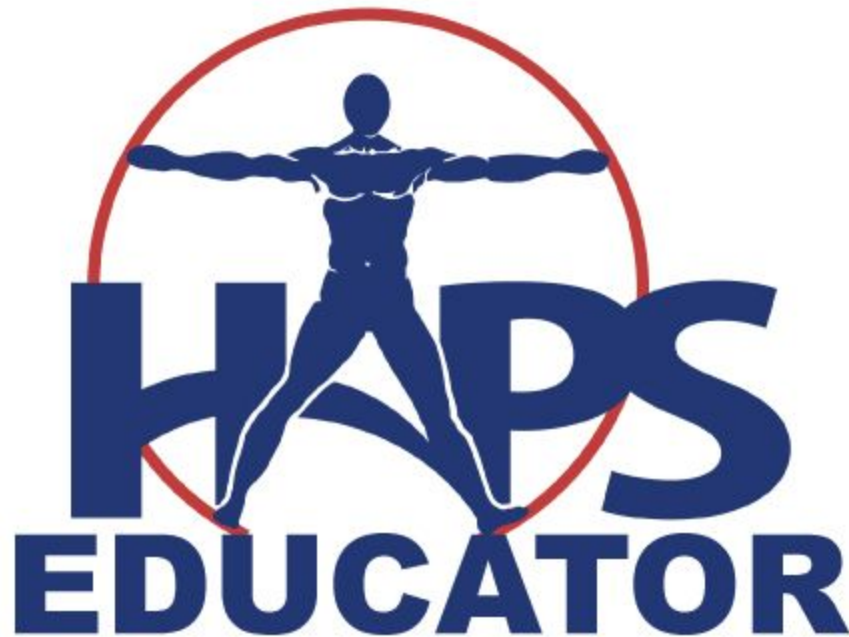**Using ePortfolios in Anatomy and Physiology**

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Using ePortfolios in Anatomy and Physiology

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Abstract

The ePortfolio is a tool for students to display academic accomplishments. It uses a learning-orientated approach that allows students to more fully engage in the academic process within and across disciplines. Use of the ePortfolio in anatomy and physiology encourages students to incorporate the hierarchy of structure, from chemistry to cells to tissues, and reinforces the significance of the integration of body systems. Reflection on the learning process becomes an integral part of the final ePortfolio creation. In anatomy and physiology labs, ePortfolios give students the opportunity to easily compile and manipulate data from lab exercises and add images from multiple sources to form a comprehensive electronic laboratory notebook (ELN). Anatomy and physiology students have expressed appreciation for the opportunity to have a centralized location for archiving course content and for the benefits that come from being asked to take time to reflect on their learning. doi: 10.21692/haps.2017.026

Key Words: artifacts, ePortfolio, integration, pedagogy, reflection

Introduction

An ePortfolio is a digitized collection of artifacts that serves as a means to display learning accomplishments. It is in itself a learning pedagogy. The ePortfolio allows students to share artifacts for the purposes of demonstration of skills and accomplishments, reflections, commentary, and peer/instructor evaluation. As a learning-oriented approach that demonstrates student achievements towards learning outcomes, ePortfolios allow for active participation in the learning process. They exhibit student competency in knowledge, skills and techniques, and through student self-reflection, give insight into the challenges and struggles the student experiences. An ePortfolio can become a powerful medium for expressing and assessing integrative learning when instructors are purposeful in defining the components and designing the grading rubric.

Pedagogical Support for ePortfolios

There is a perception in education that authentic learning occurs best when the learner is an active participant in the process. EPortfolios can be used to shift the locus of control from the teacher to the student, thereby nurturing student engagement. When students incorporate artifacts from multiple disciplines and are asked to synthesize and reflect on them, ePortfolios can become a vehicle for developing integrative knowledge and skill (Bryant and Chittum, 2013). The use of ePortfolios offers a means of surfacing new evidence of learning beyond the traditional educational assignments and exams. It allows students to showcase and make connections between the learners' unique and varied learning experiences and demonstrates competency for designated course learning outcomes. By developing these showcases, students are also creating tools that can demonstrate competencies and abilities for employment

or application to graduate programs (Penny-Light 2016). Deneen and Schroff (2014) found emerging evidence that ePortfolios contribute to the development of high-value outcomes including metacognition, which is a competency closely related to early career success.

Dannenberg *et al.* (2016) from the University of Alaska Anchorage (UAA) explored opportunities for integrating evidence-based learning through the use of ePortfolios. After six years of incremental development, the use of ePortfolios is now campus-wide. From the beginning a faculty-led taskforce had a driving thought that ePortfolios were more than a mere tool for displaying work. The integration of ePortfolios supported pedagogy that was already happening inside the classroom. In a similar example, Dr. Yang, Associate Professor at Prince of Wales Clinical School, UNSW Australia, incorporated the use of ePortfolios to assist students in their learning in *Cancer Sciences*, an upper level undergraduate course. The ePortfolio was composed of distinctively interactive aspects including formal and informal assessment, discussions, goals, reflections on learning both on and off campus, and analysis of the student's strengths and weaknesses. The ePortfolio specifically targeted students' life-long and life-wide learning (Yang, 2016).   Life-wide learning refers to students learning important lessons throughout their entire college experience, not just in the classroom (Ecan, 2016). Students then wrote forthrightly in their ePortfolios and received periodic and final feedback and evaluation. They were encouraged to practice and improve their reasoning skills (Yang, 2016). Students were invited to think and act like scientists and to become professional or scientific inquirers in the field through learning scientific concepts and techniques. Student ePortfolios and final

summaries were assessed using an integrative learning value rubric developed by the AACU in the course (Yang, 2016).

The Role of the ePortfolio in the Classroom

The creation of the ePortfolio requires students to review their course content and identify selections that exemplify competency of knowledge and application in those topics. Drafting text, creating videos, and explaining illustrations engage the student in the content differently from preparing for unit exams and further reinforce the content. One of the challenges in teaching anatomy and physiology is incorporating the hierarchy of structure throughout the course and reinforcing the significance of how the body systems are integrated. The details of chemistry, cells, and tissues that are covered either in pre-requisite courses or in the early weeks of an initial anatomy and physiology course can be incorporated into other anatomy and physiology courses when pertinent information is contained within an ePortfolio. The ePortfolio is a tool for students to explain how body systems are integrated using various homeostatic mechanisms. Through the use of ePortfolios students are able to connect previous content to new concepts, thus the linking of information more efficiently.

Learning involves a process. Some approaches lead to achievement and other attempts are less successful. Metacognition can be intentionally achieved when students reflect on their learning journey. The ePortfolio is a means by which students can easily highlight significant experiences and later reflect upon them. Reflection involves higher order thinking beyond the facts and the organizational framework. Reflection engages the student in active learning and directs them to develop an internal locus of control.

The Role of the ePortfolio in the Lab

Eynon, Gambino, and Török (2014) provide several examples of improved undergraduate student success measures as a result of implementation of ePortfolios. The majority of their data reflects traditional, didactic examples and the use of ePortfolios in laboratory environments can have a similar impact. In the majority of anatomy and physiology laboratory experiences students use either standard or customized lab manuals created through major publishers such as Pearson, McGraw Hill, and Morton. Although valuable for student success, these manuals do not offer the opportunity to easily compile and manipulate data from lab exercises, nor do they offer the ability to add images from microscope slides, online images, or photos taken from specimens or the models used in lab. Use of electronic laboratory notebooks (ELNs) is increasing in undergraduate education (Johnston et al. 2013), but for many students whose lab experiences are limited to anatomy and physiology, microbiology, and maybe general biology and/or general chemistry, the cost of an ELN in addition to the current lab manual may be prohibitive.

Paper lab manuals provide space for data collection but often do not provide a means for the compilation, analysis, and comparison of results from all participants in the lab section, or across multiple lab sections. Through the use of electronic data collection in software such as Microsoft Excel, students can collect, share, and then archive their results in their ePortfolio. Subsequently, students can provide analysis and reflection on their lab experiences, which they can refer to in preparation for lab practical exams. For students who pursue nursing and allied health clinical degrees the ability to refer back to these lab results may be integral in their interpretation of related clinical applications.

In microscopic and dissection labs, students may have representative images in their manuals that differ from their actual slides or specimens. Through the use of an ePortfolio students have the opportunity to take their own photos of their dissection and then directly annotate important features and cues to assist in identifying structures on future lab assessments. In some microscopic labs, images can be captured from microscopes and shared with students. In other cases, students seek online sources for microscopic images, which could then be incorporated into their ePortfolio archive. Through access to multiple images rather than the limited options in the lab manuals students can reduce the likelihood of misinterpretation of anatomical and microscopic features.

Many students take photos of lab models or seek other examples through online sources. The ePortfolio provides students with a centralized location to archive these images and provide their own narrative on the relationships and functions of the structures. Subsequently, students create their own library of content to which they will have permanent access, which will be a valuable tool in future coursework, especially for those students in nursing or allied health programs.

Although the value of the archive and narrative/reflection on learning benefits of the ePortfolio in the anatomy and physiology lab cannot be overstated, the ePortfolio is also an excellent venue for student lab presentations. All too often laboratory instructors rely solely on the lab quizzes and exams as the means of assessing the learning outcomes. Requiring students to create an ePortfolio that represents their achievements and challenges in anatomy and physiology lab can provide substantive evidence of student learning. By including a requirement for self-reflection, students will gain an appreciation for the learning they have achieved.

Anatomy and Physiology Student Perspectives on ePortfolios

During the 2016-2017 academic year ePortfolios were implemented in select anatomy and physiology courses at Baptist College of Health Sciences. Students were instructed to create an e-Portfolio "showcase" using either the Via LiveText software (piloted by the College) or the Wix.com free online software. The instructions required that the showcase include at least 3 "artifacts" or "representations of learning" which could include excerpts from assignments, case studies, quizzes, exam questions, or summary notes on a particular topic. Students were strongly encouraged to not limit their artifacts to their "best" work, but rather to choose topics they initially struggled to learn. As the course progressed and their study skills improved additional artifacts should demonstrate significant improvement and/or achievement. In addition, for each artifact or "representation of learning" the student had to provide a "reflection" document that discussed their strengths and/or weaknesses regarding the learning, the value of the artifact as it applies to future courses, and the value of the artifact as it applied to their future profession.

In the three anatomy and physiology courses included in the initial implementation, 51 students completed ePortfolios. Additionally, nine students enrolled in Pathophysiology built upon their initial anatomy and physiology showcase to demonstrate application of anatomy and physiology concepts in understanding the pathophysiology of several disease states. Student feedback was universally positive, with many expressing appreciation both for the opportunity to have a centralized location for archiving course content and for the benefits that came from being asked to take time to "think about my own strengths and weaknesses in learning". Faculty reported that they too were able to improve their approach to teaching certain topics after reading the reflections and gaining insight into the challenges students face.

Lessons Learned

As with any new pedagogical approach or software tool there are challenges in implementation, unanticipated events, and process issues. Some of the lessons learned from an ePortfolio implementation may be unique to the institution or the choice of software, but others are universal and worthy of mention. First amongst the latter category is the challenge many students face in constructing meaningful reflections. Faculty from Baptist College of Health Sciences found that many of their younger students had never been asked to evaluate their own metacognition or reflect in any way on the learning process. As a result, initial ePortfolio submissions consisted of simple statements that lacked significance and depth of thought. In addition to the weak reflections, few students had ever viewed ePortfolios, which limited their reference point for construction of quality learning examples.

To address both these concerns, faculty developed their own sample portfolios and sought online examples to provide guidance to their students. Allowing students some class/lab time to share and collaborate while developing their ePortfolios fostered peer-peer learning, generating excitement over the accomplishments of others and appreciation of the value gained from the reflection and the archiving of information. Additionally, creating incremental due dates as students developed their ePortfolios minimizes potential student frustrations. With a single, end-of-course due date students may receive a poor grade because they left the work to the last minute, did not fully understand the requirements, or did not find value in the ePortfolio assignment.

Although the majority of the students who participated in the Baptist College of Health Sciences first year implementation found the ePortfolio to be a very valuable tool, there were a few students who struggled to appreciate its benefits. These students failed to see the value of reflection on learning in a science course. Predominantly these students struggled to master the anatomy and physiology content and subsequently did not have the time to devote to the ePortfolio assignment. Unfortunately, these opinions are likely to be shared by other anatomy and physiology students. ePortfolios are not only a tool, they are a pedagogical process. Faculty must use the ePortfolio as a learning approach that demonstrates to students the effectiveness of archiving course content and self-reflection as a means to develop strong metacognition. It is the responsibility of the faculty to effectively communicate to their students the importance of "thinking about learning". This reflective process will improve content retention and the ability to apply this knowledge in the current and subsequent courses as well as in their future careers.

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