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Editorial

Developing Learning and Teaching Repository as a Resource to Improve Biological/Biomedical Science Teaching and Education

Alireza Golestani, Ahmed HK El-Hashash*

Texas A&M University, Butler Hall, 3258 TAMU College Station, TX 77843-3258, USA

*Correspondence: Ahmed EL Hashash (ahashash@exchange.tamu.edu)

Abstract: Making students efficiently and flexibly understand and master the knowledge of biological/biomedical sciences by prompting active learning and critical thinking and making biomedical science courses form an integrated system are critical for more successful and effective student education, future and career. However, the current biological/biomedical education system worldwide tends to produce graduates best suited for postdoctoral training, and academic careers, in highly specialized areas. Many institutions worldwide currently favor densely packed curricula with fast-paced instruction focused on detailed subject matter, with little room left for skill training in both active learning and critical thinking, creative problem solving, professional skills, putting what was learned into a larger context that creates meaning, and teaching students with different learning styles, despite their significance. In this article, we will discuss the current defects in biological/biomedical science education and the need to reform biomedical science teaching and education. We will also describe some suggestions and approaches to improve biological/biomedical science learning and education, including the establishment of a more effective learning/teaching repository.

Keywords: Biomedicine/Biological Science, Blackboard, Digital Learning, Learning and Teaching Resource Repository

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1. Introduction

There is always a need to store and manage learning and teaching resources for biological/ biomedical sciences at universities and other higher education institutions. Many universities across the USA and Europe have introduced an online repository for teaching and learning materials of biomedicine and other science fields [1-3]. However, the take-up from instructors who are using these conventional repositories is generally low and tutors do not make much use of these online repositories [4-6]. Instead, the current practice in many universities worldwide is to use the Blackboard virtual learning environment (VLE). The Blackboard VLE system is now widely used by tutors/lecturers to place their learning and teaching resources. Most learning/teaching resources are placed on Blackboard, linked web pages, or blogs. In this process, tutors can share their resources by e-mail or by enabling their colleagues to download from Blackboard, which may not currently be the most convenient process since these resources are module-based and are not generally searchable by tutors/lecturers. In addition, losing resources within many folders in Blackboard is easy and spending time to find them amongst the long list of all the weekly topics or the files area is another problem [4,6-10].

Furthermore, there is a major difference between Blackboard VLE and repositories since most VLEs, including Blackboard VLE, work on the principle of storing contents within folders, while learning and teaching materials-based repositories do not adopt a

similar structure. The archiving of Blackboard courses within Blackboard VLE so that tutors can look back over many academic semesters at the resources within them adds further complications to Blackboard users and makes the management of these contents/ resources within Blackboard VLE challenging and problematic in the future [4,10]. Therefore, VLEs, including Blackboard VLE, are not a repository since they are not designed for the storage and management of learning and teaching materials/resources. Appropriacy designed repositories could offer a potential solution.

Learning resource repositories are computer-based systems that are utilized in storing and managing several collections of learning/teaching resources and/or the metadata describing such objects [1-3,5,11,12]. Digital repositories have three primary functions; depositing, storing, and accessing digital content, and can provide interfaces that allow contents to be input and output. Some digital repositories have more advanced features, including metadata enhancements, addition of comments, feedback and reviews, and functions related to the end user such as the creation of personal collections [5,11-13].

The use of teaching and learning repositories evolved as the universal practice within many institutions worldwide [1-3,6,12,14-16]. However, they are mostly conventional teaching repositories that do not effectively meet instructors' needs. Therefore, the take up from tutors/lecturers who are using these repositories is low, despite being active in uploading their teaching materials to the VLEs, e.g. Blackboard, and public services (e.g. YouTube and Flickr), but not to these teaching repositories [4,5]. The poor engagement of tutors/lecturers in these repositories is probably due to the nature of these repositories that cannot function in a way that reflects the particular way that learning/teaching materials are used and they, therefore, need many changes to meet users' needs [4,5]. Thus, a major reason for the poor uptake in use of these conventional teaching materials repositories lies with their design that need many changes to meet users' needs, besides some legal, cultural, and organizational issues [4,5,7,8,11]. Therefore, there is a need to properly design a teaching and learning resource repository that meets tutors' needs and promotes their engagement with the learning and teaching repository.

Previous studies have demonstrated that the conventional teaching repository structure and metadata system do not currently meet instructors' needs. Also, they do not currently seem suitable for both managing and interactive use of the day-to-day teaching and learning resources used by teaching staff/tutors [5,9]. Therefore, there is a growing need to design an appropriate repository intended for the storage and management of learning and teaching materials and resources of biomedicine and other science fields.

Accumulated evidence shows that instructors prefer small-scale sharing (i.e., to share with immediate colleagues) usually using emails or personal websites. In addition, many instructors don't prefer to share their materials at all [4,7-9]. Therefore, there is a growing need to promote large-scale sharing using teaching and learning resource repositories, rather than small-scale sharing amongst instructors, and develop a repository culture by integration with other national and international repositories and systems that will enhance university teaching and learning.

If well designed, the teaching and learning resource repository can have tremendous benefits to biological/ biomedical education, and a great impact on biological/ biomedical student learning, success, and future career. Indeed, a well-designed teaching and learning resource repository could also enhance the learning of medical, biological, and students in other fields. This type of repository can serve as additional resources of best practices, lesson plans, and sample modules of biological/ biomedical and related teaching courses. It can also serve as an instructional tool, which both support and supplement biological/ biomedical instructors' classroom instructions. Interestingly, recent studies describe the methods of developing an online repository of effective practices that can contribute to teaching culture at several institutions of higher education and support the development of both learning and teaching [2]. Similarly, education

scientists have recently developed the Purdue Repository for Online Teaching and Learning (PROTAL) at Purdue University as an open educational resource (OER) to improve the online teaching strategies of higher education instructors and established Human Performance Technology-OER model to design digital repositories after identifying problems faced by instructors who struggled with the PROTAL [13].

Furthermore, a well-designed teaching and learning resource repository can provide just-in-time knowledge for biological/ biomedical science instructors, who can easily find handouts, articles, videos, and other resources to inform their teaching, learning, and educational scholarship [5,6,11,12,16]. In addition, there are many benefits to the university when having an effective central online repository and in both managing and sharing its e-learning resources [4,5,7-9,12,17]. Notably, online repositories for research publications in biology, biomedicine, and other fields are not suitable to be used as learning and teaching resource repositories due to the remarkable differences in their design, use, functionality, and accessibility [4,5]. Finally, a well-designed teaching and learning resource repository could also support face-to-face learning, online learning, blended learning, hybrid learning, distance learning, and other learning methods that are needed during crisis times such as those that emerged from the COVID-19 pandemic.

2. Summary and Conclusion

A common practice of instructors in many universities worldwide is to use the Blackboard virtual learning environment (VLE) to place their learning and teaching resources. Moreover, the take up from instructors who are using conventional teaching repositories is generally low. Blackboard VLE is not designed for the storage and management of learning and teaching materials and is therefore not a repository, and instructors prefer a small-scale sharing with immediate colleagues by email or personal websites, rather than large-scale sharing of their teaching materials. Therefore, there is a need to design an appropriate learning and teaching resource repository that could offer a potential solution to these problems in biology, biomedicine, and other fields to meet the needs of instructors and promote large-scale sharing rather than small-scale sharing amongst biology/biomedicine instructors. Interestingly, there is a growing increase in the number of well-designed learning/teaching resource repositories for biological/biomedical education and other fields at different institutions worldwide. These repositories can support different forms of learning, including face-to-face learning, online learning, blended learning, hybrid learning, and other learning methods that are also needed during times of crisis [1-3,13].

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