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Adoption of open educational resources (OER) textbook for an introductory information systems course

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ABSTRACT

Open educational resources (OER) can make educational resources widely available to all students and educators for free; however, OER are still untried in many academic programmes in higher education. This article reports a case of adoption of an open access textbook for an introductory information systems course and discusses the process and suggestions of adoption of an OER textbook based upon the authors' own experience. The study indicates that the process of adoption of an open access textbook demands more intellectual work on the instructors' side in comparison with the adoption of a new commercial textbook. The study suggests that discipline-based communities of practice (CoP) can ease the workload problem in the process of adopting OER textbooks. The findings are important in encouraging the OER community to shift from project-based OER textbook development to discipline-based CoP for effective OER textbook adoption.

KEYWORDS

Open educational resources (OER); open access textbook; course design; textbook adoption

Introduction

Open educational resources (OER) have been initiated longer than a decade ago ('MIT OpenCourseWare', 2017; 'The William and Flora Hewlett Foundation', 2017). OER represent the innovative ideas to make educational resources available for all learners for free. OER made a dramatic appearance in the early twenty-first century (Gaskell, 2009; Wiley & Gurrell, 2009). The challenges for the adoption of OER open access textbooks in the higher education sector are more severe than those in the K-12 education (i.e. primary/elementary education and secondary education) sector or community colleges because of many important characteristics of higher education. Qualified writers of textbooks in higher education are not as many as those in the K-12 or the community college sectors, especially in any specialised or new disciplines. The curricula in higher education are less standardised than those in the K-12 or the community college sectors. Furthermore, the social and political visions of the educators in higher education are highly diversified (Robie, Kidwell Jr., & King, 2003). On the other hand, commercial publishers not only sell various textbooks, but also provide excellent services to instructors and students in the higher education sector. The

approaches to the adoption of OER open access textbooks in higher education greatly depend on the missions and policies of educational institutions, the motivations of individual educators and the competition between OER and commercial publishers. Currently, few systematic and conclusive reports on the sustainability of OER and the impacts of OER on higher education can be found in the literature or on the Internet. While, many universities are practicing OER, the majority of academic programmes in higher education have not tested OER (Allen & Seaman, 2014; Kortemeyer, 2013).

To understand more about OER, the authors launched a project of OER adoption for their programmes. The project has successfully adopted an open access textbook to replace the current commercial textbook for an introductory information systems (IS) course. This article describes the process of adoption of the open access textbook based upon the authors' own experience, and reports a case by addressing how faculty can adopt open access textbooks for the IS course and what challenges they might be faced with. The rest of the article is organised as follows. A review of related work in the literature is presented first, followed by background information of the case report. The article then presents the considerations and the process of adoption of open access textbook for the course, it demonstrates the evidence of the case, and offers a reflection note. Finally, the last section summarises the broader contribution of this article.

Related work

Creative Commons ('Creative Commons OER Case Studies', 2017) lists a large number of compelling case studies of OER from around the world. These case studies report initiations of OER projects at the national, regional or institutional levels. After several years of OER initiation, adoption of OER has become a critical issue of the OER movement. As OER materials are available in digital formats, adoption of OER is claimed to have intangible benefits other than costs, including portability, enhanced learning, convenience in accessing and increased student engagement with technology (Ye, 2015). Adoption of OER materials is claimed to contribute knowledge production and dissemination which in turn contributes to social equity, economic and social development and democracy (Shrivastava & Shrivastava, 2014). Research studies have suggested that educators' perceptions shape whether or not to adopt OER materials (Ganapathy, Wei, & Jong, 2015). Yet, the awareness of OER is not sufficient for educators to include OER in their teaching process, and the educational administration and institutional policies play significant roles in OER adoption (Sutton & Chadwell, 2014). There have been many case studies of adoption of OER materials in the literature, and each case study has its unique research questions. The research questions discussed in the archive of case studies of OER adoption include cost saving ('The Open Education Consortium', 2015), student retention (Tresman, 2002), faculty perceptions (Hilton III, Gaudet, Clark, Robinson, & Wiley, 2013), institutional strategy of OER (Ives & Pringle, 2013), institutional culture change (Rolfe & Fowler, 2012) and cross-institutional collaboration and innovation (Pawlyshyn, Braddlee, & Miller, 2013). Most recently, research into OER adoption has opened new discussions on incentives and barriers to OER adoption (Belikov & Bodily, 2016). Institutional support, whether in the form of course load reduction or special curricular development assistance, is crucial for OER adoption. This subject is particularly pertinent to the focus of this study which reveals that, in comparison with the adoption of a commercial textbook, the adoption of an open access textbook demands more intellectual work on the instructors' side.

Despite a large volume of OER case studies in the literature, few published case studies of OER adoption have recorded a detailed process of OER textbook adoption from the perspective of individual faculty members. The roles of individual faculty members in OER textbook adoption beyond the subjective perceptions have not been fully discussed in the literature. Hence, objective data are needed to provide important insight into the OER adoption process. This case study attempts to make a contribution to the literature by providing first-hand evidence of the OER textbook adoption process applied to a course which is commonly offered at university-level business programmes.

The case

The introductory IS course discussed here, refers to IS 2010.1 Foundations of Information Systems in the IS 2010 curriculum guidelines (Topi et al., 2010). It is a core course for all business majors at most business schools. Regardless of the commonality of this course in business education, there have been a variety of ways to teach it, and the contents of this course are not always taught uniformly (Baugh & Kovacs, 2011). In addition to non-technical contents, many business programmes use this course to enhance students' computer literacy by including computing lab technical modules (Wang, 2007). For example, the official description of the introductory IS course offered in one of the authors' business programmes clearly specifies the requirements for technical components.

Introduction to the management and use of information systems (IS) in organizations. Topics such as functional information systems, enterprise information systems, e-business, system design, implementation and evaluation, and ethical issues related to information systems will be covered. In addition to concepts and theories, students will develop an Access database to enhance their understanding of information systems in general and get familiar with database technology in particular.

Likewise, a combination of various assessment instruments, including quiz test, essay, technical assignment and project, are often used in this course to meet the learning objectives designed by a business programme (Wang, 2007). The present online introductory IS course uses quiz tests, database technical assignments, online discussion topics and course report for assessment.

Many commercial textbooks for the introductory IS course are available on the market. The commercial textbook used for the present introductory IS course is one published by Pearson (2017). The price of the textbook is about \$150 USD for a new copy. The publisher has provided excellent academic services for this textbook as well. Not only do they provide a complete set of ancillary materials of the textbook, including a test bank, teaching manual, lecture PPT (PowerPoint slides), study guide but they also offer an online Lab for students to practice technical assignments, including Microsoft Excel and Access. As an access code is needed to access the publisher's online Lab, a used copy of the textbook without an access code is hard to substitute a new copy. Nowadays, publishers update their textbooks more frequently than ever, and ancillary teaching materials are also updated accordingly to ensure quality (Zinser & Brunswick, 2010). The quality of academic services provided by the publisher presents a great challenge to the adoption of an open access textbook for this course.

To maintain the current curriculum design and requirements, this open access textbook adoption project was not intended to change the requirements or the assessment scheme which have been applied to this course for years. The assessment methods include quiz tests

(30%), discussions (or short essays) (15%), technical assignments (Microsoft Access) (20%) and course reports (35%). The course reports require students to apply the knowledge learned from the course to examine information systems in real-world business organisations.

This study applies the action research approach (Denscombe, 2010) to practice a reflective process of adoption of an OER textbook for the common business course through a case study. The motivation of the study is to understand the problems faced by the adopting instructors during the adoption of the OER textbook, and to solve these problems. The design of this study focuses on the process of adoption of the OER textbook. The study does not investigate adaptation or modification of the contents of the adopted OER textbook to cater for the students' learning difference. The case study records all steps of the adoption process to collect evidence on the issues of adoption of OER textbooks. By adopting an OER textbook, the adopting instructor takes the responsibility to ensure the quality of the students' learning. The results from the case study allow the authors to understand more about fundamental issues of knowledge sharing and collaboration in the OER community in the context of the OER textbook adoption process.

Process of adoption of open access textbook and suggestions

This section explains the process the authors have carried out for the adoption of an open access textbook for the introductory IS course, and presents suggestions for people who are interested in adopting open access textbooks.

Preliminary search for OER textbooks for the introductory IS course

Creative Commons (2017) provides background information about OER, and explains different types of licences of OER to guide the use of OER. There are many OER organisations around the world. Many web portals of educational institutions contain linkages to the OER websites, but few make the search for a specific discipline easy. OER comprise many forms of educational resources, including articles, videos and books. In this project, the authors focus on open access textbooks for the introductory IS course. The authors' intensive search revealed only a few open access textbooks related to the introductory IS course. Some of these open access books, developed years ago, have become 'legacy' books already. Each of the open access books the authors found usually has reviewers' comments, but few books have more than one reviewer.

Selection of an OER open access textbook for the course

The review work in this project is not difficult because the number of available open access textbooks for the course is small. The authors carefully reviewed four open access textbooks to determine whether any of them can meet the present needs. The authors finally chose Bourgeois' textbook (2014) published by Saylor Academy (2017) for this project of adoption of an open access textbook. The authors consider that, in terms of the topics covered and the contents, this open access textbook is not significantly different from the commercial textbook currently used for the course, and the difference between the two alternative

textbooks would not be a considerable factor for the teaching and learning effectiveness of the course.

Search for OER teaching materials related to the adopted textbook

Ancillary materials of a textbook are important for instructors because they can assist the instructors in the preparation for the course. To determine whether an open access textbook has ancillary teaching materials, the adopter needs to contact the publisher and/or the author of the textbook. The authors of this paper did not find any IS-related open access textbook that comes with ancillary teaching materials. If the publisher and/or the author of the book is unable to provide information about ancillary teaching materials developed by others, then an intensive search on the Internet might be necessary. In this project, the authors were fortunate to find open access lecture PPT slides and other useful OER materials (Guthrie, 2017) developed by Professor Guthrie and her colleagues for this OER textbook.

Development of instruction materials for the adopted textbook

If no useable OER instruction materials (e.g. lecture PPT slides) for the selected open access textbook can be found on the Internet, the instructors must develop instruction materials by themselves. If the available instruction materials are OER and are allowed to be modified, modification of the OER instruction materials (lecture PPT slides) might be needed. In this case, only minor changes to the lecture PPT slides available on (Guthrie, 2017) were made to fit the authors' teaching preferences.

Development of proprietary assessment instruments

Self-assessment using OER is one of the many distinctive features of OER (Conrad & McGreal, 2012). However, summative assessment is commonly applied to measure the level of competency of students in the current higher education environment. The use of all genuine OER materials introduces an issue for summative assessment in the open access environment because assessment instruments could be open to every student. The use of open access test banks without access control might compromise academic integrity and educational ethics. This issue has not been widely discussed in the literature of OER, and few protected free-to-use test banks have been reported in the OER community. The present case study did not intend to make fundamental changes to the current summative assessment scheme of this course. The publisher of the commercial textbook currently used for this course assures the instructors that its test bank is secured because the publisher keeps it away from students. Also, the publisher follows the common practice applied in the commercial textbook industry that a new edition textbook is accompanied by a new test bank, and the new test bank has little overlap with the old one. When no commercial service of a protected test bank for the adopted open access textbook is available, the development and management of a proprietary test bank, including quiz tests and assignments (e.g. essay topics and discussion questions) for authorised access are necessary for the adoption of an open access textbook.

Development of technical module to fit the curriculum

The introductory IS course requires a computing lab technical module which is not a part of the textbook. The development of a teaching module of Microsoft Access database is another demanding task for the adoption of an open access textbook in this project. Supplemental technical material, assessment instruments, and a computer lab practice guide for the technical module are three important components for the technical module. In this case, the authors revised the technical module, which was developed and used for this course before the commercial textbook published by Pearson was adopted a year ago, to make it consistent with the latest version of Microsoft Access as well as the content organisation of the adopted textbook. As the OER textbook adoption was constrained by the earlier decision not to change the assessment structure of the course, the revision of the technical module was insignificant and did not impact upon the existing assessment scheme. Clearly, if a technical module along with its assessment instruments need to be developed from scratch to meet the curriculum requirement of the course, the adoption of an open access textbook could involve much significant development work.

Implementation of teaching and learning materials on the online learning management system

Nowadays, online learning management system (LMS) are used not only for online courses, but also for non-online courses. Implementation of all teaching and assessment materials on LMS is a natural step in the adoption of open access textbooks. In this project, the course has its existing LMS course site. Regular maintenance of the course site and uploading new files of teaching materials are normal, but the proprietary test bank and assignments generated by word processing have to be manually inputted into the LMS by retyping because of a lack of tools for the format conversion. The course site must clarify the exclusivity and confidentiality of the proprietary assessment instruments used for this course after the statements of acknowledgement and credits for the open access textbook and open access instruction materials.

Evidence

Table 1 summarises the process and suggestions for the adoption of an open access textbook for the introductory IS course. The project of adoption of the open access textbook has been implemented in one of the authors' business programmes, but is still in the pilot stage. Only the online class of this introductory IS course uses the open access textbook. Thirty-eight (38) students have taken this online course in two sections during the past academic year. The course site includes an online questionnaire survey with seven questions about perceived benefits of open access textbooks as well as the quality of the adopted open access textbook. Students' opinions on free open access textbooks and the use of the adopted open access textbook for this course are very positive. The authors have conducted a preliminary analysis of students' scores in the sections with the open access textbook in comparison with that in the previous section with the commercial textbook. The analysis examined the students' performance in four categories: quiz tests, technical assignments, online discussions and course reports. The statistics reveal no notable impact of the adoption

Table 1. A summary of practice of adoption of OER textbook.

Tasks	Major activities	Assumptions and considerations	Estimated workload (person-hours)
Preliminary search for OER and open access textbooks for the introductory IS course	<ul style="list-style-type: none"> Learn about OER and Creative Commons Licence Search open access textbooks related to the introductory IS course 	<ul style="list-style-type: none"> The availability of OER highly depends on disciplines 	30–40
Selection of an OER open access textbook for the course	<ul style="list-style-type: none"> Review the collected open access textbooks for the course Make a choice for adoption 	<ul style="list-style-type: none"> The number of available open access textbooks for the introductory IS course is small 	5–10
Search for OER teaching materials related to the adopted textbook	<ul style="list-style-type: none"> Contact the publisher and/or the author for teaching materials Search the Internet for OER that are related to the adopted textbook 	<ul style="list-style-type: none"> Few open access textbooks have ancillary teaching materials The workload highly depends on the availability of ancillary teaching materials for the textbook 	40–50
Development of instruction materials for the adopted textbook	<ul style="list-style-type: none"> Review and modify OER instruction materials (e.g. lecture PPT) as needed 	<ul style="list-style-type: none"> The workload highly depends on the availability and the usability of the OER instruction materials for the textbook 	10–20
Development of proprietary assessment instruments	<ul style="list-style-type: none"> Develop a private test bank Develop a set of unique assignments (e.g. essay topics, discussion topics) 	<ul style="list-style-type: none"> Proprietary assessment instruments are necessary to maintain the academic integrity and ensure the quality of learning when the textbook and its ancillary materials are open access 	30–50
Development of technical module to fit the curriculum	<ul style="list-style-type: none"> Develop a teaching module of Microsoft Access database Develop assignments for the technical module Computer lab setting 	<ul style="list-style-type: none"> The needs for this part highly depends on the curriculum design, the requirements of the course, and the existing resources before the adoption of the open access textbook 	30–80
Implementation of teaching and learning materials on the online learning management system (LMS)	<ul style="list-style-type: none"> Design the course site on LMS Organise all teaching materials on LMS Implement the assessment instruments (tests, assignments, discussions) on LMS 	<ul style="list-style-type: none"> The workload on this part highly depends on the adopter's competence of LMS The authors assume that the course site has been existing before the adoption of the open access textbook 	20–30
Total			165–280

of open access textbook on the students' performance in any of these assessment categories. The analysis suggests that the open access textbook is workable and the process of adoption is successful in the sense of adding value to the IS programme.

In the present case, the corresponding commercial textbook published by Pearson provides all needed ancillary materials, including lecture PPT, teaching manual, study guide and test banks. These ancillary materials can be readily uploaded to the LMS at insignificant time. The publisher also allows a student who purchases a new copy of the textbook to access the online computing lab hosted by the publisher. The online computing lab is capable of providing online technical assignments needed for this course. The authors' observation is that an instructor who uses a commercial textbook for this course might spend several hours on the selection of the textbook, but would not need to spend any time on the development of ancillary teaching/learning materials for the adopted commercial textbook. Table 2 summarises the practices of adoption of a commercial textbook for this course for a comparison with Table 1. As presented in Tables 1 and 2, the estimated workload for the adoption of the OER textbook for this course is about 165–280 person-hours, while the

Table 2. A summary of practice of adoption of commercial textbook.

Tasks	Major activities	Assumptions and considerations	Estimated workload (person-hours)
Preliminary search for candidate commercial textbooks for the introductory IS course	<ul style="list-style-type: none"> • Search major publishers for textbooks related to the introductory IS course • Contact sales representatives of the publishers to collect desk copies and their ancillary materials online 	<ul style="list-style-type: none"> • This course is not a new course, and has been using commercial textbooks 	5–10
Review candidate commercial textbooks and make a decision for the course	<ul style="list-style-type: none"> • Review the collected desk copies and their online ancillary materials for the course • Make a choice for adoption 	<ul style="list-style-type: none"> • The number of candidate textbooks for the selection is typically about 3–5 	6–10
Test the publisher's online computing lab and select technical assignments	<ul style="list-style-type: none"> • Select the assignments from the publisher's online computing lab to meet the course requirements 	<ul style="list-style-type: none"> • The selected commercial textbook must have its online lab hosted on the publisher's web site 	5–10
Install teaching and learning materials on the online learning management system (LMS)	<ul style="list-style-type: none"> • Design the course site on LMS • Organise all teaching materials on LMS • Install the assessment instruments (for written tests and assignments, discussions) on LMS as needed 	<ul style="list-style-type: none"> • The workload on this part highly depends on the adopter's competence of LMS • The authors assume that the course site has been existing before the adoption of a new commercial textbook • The publisher provides ready-to-import files to install assessment instruments for written tests and assignments on LMS 	5–10
Total			21–40

estimated workload for the adoption of the commercial textbook for the same course is about only 21–40 person-hours. To meet the curriculum requirements, the adopters of the OER textbook must spend considerable time in developing ancillary teaching materials, technical modules and proprietary assessment instruments.

The case study makes a contribution to the literature in two aspects. First, it delineates the process of selecting an OER textbook, developing the related materials for assessment and discussion, and deploying them into the online classroom. The process can be applied by others who consider adopting OER textbooks. Second, this case study provides an important insight into the demands for intellectual work on the instructors' side in the process of OER textbook adoption. The findings can be valuable for higher education institutions in making policies for OER adoption.

Discussion

The future of OER is not easy to predict (Hilton III & Wiley, 2011). However, OER is unlikely to disappear. Few educational institutions in higher education would ignore OER adoption completely, given the social and political influences and students' interests. While, educational institutions develop their strategies and policies on OER, individual instructors play the key roles in practicing and testing OER. Adoption of OER textbooks is one of a set of important practices for faculties to gain more understanding of OER. There have been many OER research papers published by OER research communities (e.g. the 'OER Hub', 2017) and

academic educational journals; however, adoption of OER textbooks is still a relatively new subject, and few reports which are similar to the present case study with detailed descriptions of an adoption process as well as the recorded evidence can be found in the literature for a comparison.

This article provides a first-hand experience of the adoption process to use an open access textbook for the introductory IS course, but is not intended to suggest the impacts of OER on teaching and learning effectiveness or aggregated cost saving for students and educators. The following lessons the authors learned from this case study can be useful for other instructors in adopting OER open access textbooks. First, OER have made open access textbooks available in many academic fields. However, there is a lack of organised marketing channels in OER, and adopters of OER textbooks must carry out intensive searches to find their needed OER textbooks. Second, the process of adoption of an open access textbook demands much more intellectual work on the instructors' side in comparison with the adoption of a new commercial textbook. This is mostly because of the lack of ancillary materials for open access textbooks. The findings have verified the suggestion of research (Baker, Thierstein, Fletcher, Kaur, & Emmons, 2009) that one of the top challenges for faculty in adopting a high-quality OER textbook is to obtain high-quality open access ancillary materials for the adopted open textbook. Clearly, when no or few ancillary materials are available for the adopted open access textbook, the adopting instructors must develop ancillary materials for the textbook. Furthermore, the OER community has not suggested approaches for making protected free-to-use assessment instruments available in the open access environment. Proprietary assessment instruments should be developed and protected by the adopting instructors themselves to maintain academic integrity and to set higher professional ethical standards in the open access environment. Thus, the adopting instructors of OER textbooks actually perform self-services that were otherwise provided by the commercial publishers. Finally, the fact that the adoption of open access textbooks is shifting the costs of textbooks to the adopting instructors raises many questions on the motivations of instructors and the policies of the educational institutions for adopting open access textbooks. These issues can be addressed at the organisational level only after OER adoption has been widely tested in the institution.

Nevertheless, the authors have found that communities of practice (CoP) (Lave & Wenger, 1991) can ease the workload problem. For example, in this project, two instructors from two different IS programmes joined to develop and share proprietary teaching materials and other common supplements for their comparable IS courses. Subsequently, on average the total workload for each was reduced by half. If a large number of instructors form a CoP for a common course, the average workload of development of all ancillary teaching materials for each participant could become marginal. Clearly, this case study has involved a diminutive discipline-based community, and has not investigated issues of CoP such as deployment of CoP and positive/negative aspects of discipline-based CoP. A future study of discipline-based CoP for adoption of OER textbooks is expected to extend the present case study.

This article presents a single case study and has its limitations. The case study makes a comparison of an OER textbook with only one commercial textbook, and the pool of OER textbooks in this case was limited. The limited opinion-based information collected by the authors may involve biases for any generalisation. Many factors of adoption of OER, such as attributes of OER textbooks in the pool and the specific teaching approach applied, were not considered in this case study.

In the future, the authors will conduct a follow-up OER study. Potential subjects for the future investigation of OER for this course include a more detailed analysis of the learning design of the OER material and a comparison of the OER textbook with the commercial product in terms of learning outcomes. The future study will have full engagement with the OER research communities such as (OER Hub, 2017).

Conclusion

The adoption of OER textbooks is facing many challenges in the higher education sector. This article presents an example of adoption of an open access textbook for an introductory IS course based upon the authors' own experience. This article adds value to the body-of-knowledge of OER with two conclusions. First, a successful adoption of an open access textbook to meet the designed learning objectives of the course can demand more intellectual work on the instructors' side in comparison with of the adoption of a new commercial textbook. The adopting instructors of OER open access textbooks need to perform certain self-services that were otherwise provided by the commercial publishers. Second, this OER textbook adoption project has benefited from a discipline-based community, although small, in sharing self-services. It suggests that discipline-based CoP can ease the adopters' workload problem in the process of adopting OER textbooks. The implication of this study is that the OER community ought to shift from project-based OER textbook development to discipline-based CoP for effective OER textbook adoption.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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