

Open Access Textbooks: Opportunities and Challenges

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Abstract. Different from traditional textbooks, open access textbooks are by nature open education resources that are free to use and can be delivered in electronic or printed form. Not only that the development of open access textbooks is cost-effective, the continuous revisions and updates can be made efficiently. Open access textbooks also allow easy adaptation to cater for the students' learning differences. However, for the successful adoption of open access textbooks, a number of challenges need to be overcome, such as on soliciting contributors of textbook contents, assuring the quality of textbooks, and establishing a culture of sharing education resources. This paper investigates these opportunities and challenges, and proposes a solution for the implementation and sustainable development of open access textbooks in Hong Kong. Some overseas successful projects are referenced and discussed. It is believed that open access textbooks would effectively resolve the pressing issues of high price and frequent revisions of textbooks, while offering many pedagogical advantages.

Keywords: open access textbook, open education resource, textbook development, e-learning.

1 Introduction

Traditional printed textbooks have a long history and good track record of serving as a core component in the process of teaching and learning. There are however a number of problems. The contents of printed textbooks are relatively static, and costly to update, and become even more expensive when bundled with multimedia elements. By nature, these textbooks are not flexible enough to cater for the students' learning differences as they cannot be customised for different learning objectives and contexts. The traditional publishing industry would find it increasingly difficult to keep pace with the rapid curricular development without significant increase in production costs, and consequent charges to students and parents. In recent years, the escalation in textbook prices become widespread public concerns, and at the same time there are also growing demands for active and flexible learning that traditional printed textbooks may not be able to meet.

With the advent of information and communication technologies and the prevalence of digital cultures together with the latest copyright practices, educators and researchers have been exploring the use of education resources that are openly shared and distributed over the Internet, or Open Education Resources (OER). OER is formally defined as the "digitized materials offered freely and openly for educators,

students and self-learners to use and re-use for teaching, learning and research” (Organization for Economic Cooperation and Development [OECD], 2007, p. 2). In North America, vast amount of OER for higher education have been developed. The innovations are now diffusing to the primary and secondary education levels (Kamenetz, 2010; Guttenplan, 2010; Curriki, 2011). These motivate us to explore the possibilities of developing textbooks as OER.

As a form of OER, open access textbooks are basically digitized textbooks that can be accessible online at no costs, and also available in affordable-to-purchase printed copies (EDUCAUSE, 2011). The textbook contents can be revised, reused, often remixed and customized under a Creative Commons license that permits the authors to retain ownership of their contents, yet establish the rights under which the content may be used by others (Creative Commons, 2002). Open access textbooks offer many definite advantages. For one thing, they are inexpensive to students, teachers and parents. Rapid revision and timely updates of textbook contents can be made efficiently. As well, they allow easy adaptation and modifications to cater for the students’ learning differences. Open access textbooks can be easily accessed online. They can be readily available for use in multi-media, whether in printed form or other digital forms (Leung, 2012).

The successful adoption of open access textbooks depends on at least three factors. First, there should be sufficient enthusiastic contributors who are willing to produce the textbook contents as authors, editors and reviewers. Second, the quality of the open textbooks should be well assured so that teachers and students have the confidence to use them. This requires a system for continuous quality assurance and control. Third, a culture of sharing education resources should be well established. In Hong Kong, such a culture is still lacking, partly because a common platform to enable sharing of education resources among teachers has not yet existed. It may take long time to build up the culture.

The paper will start with an elaboration on open access textbooks: the concept, opportunities and challenges will be discussed. In the later part of a solution to implement and to sustain an open access textbook system will be proposed.

2 Open Access Textbooks

Originating from open learning, distance learning and e-learning, open education resources (OER) have evolved as a promising means of teaching and learning. According to OECD, OER is defined as the “digitised materials offered freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research” (OECD, 2007, p. 2). OER range from the user-generated contents and software tools such as Wikipedia (Wikipedia, 2012) and institution-led open courseware (The Open University of Hong Kong [OUHK], 2012; The Open University, United Kingdom [OUUK], 2012; Massachusetts Institute of Technology, United State [MIT], 2012; African Virtual University [AVU], 2012; Commonwealth of Learning [COL], 2012; Open High School of Utah [OHSU], 2012; Open Courseware Consortium [OCW], 2012), to digital repositories of learning objects, learning materials and textbooks (Community College Open Textbooks Collaborative [CCOTC], 2012; Connexions [CXN], 2012; California Learning Resource

Network[CLRN], 2012; CK-12 FlexBook, 2012; Florida Distance Learning Consortium, 2012; Flat World Knowledge, 2012; Khan Academy, 2012; Gutenberg, 2012; Wikibooks, 2012).

With the advent of information and communication technologies, OER are made available online and in digital format for easy sharing and adaptation (Wikipedia, 2012). Under various types of open licenses, the author of OER grants users the freedom to use, reuse, revise, remix and redistribute the resources. In other words, with proper attribution, users can share OER with others, revise, translate or improve them and, in turn, share these new versions with others. Users can also make printed copies of the resources as they wish. There is no need to pay any copyright fees for using the resources.

Open access textbooks are a specific type of OER which can be used as official textbooks for classroom-based teaching and learning in universities, institutions and schools. They are by nature digitized textbooks that can be accessible online and downloadable for offline usage, as well as in printed copies. As OER, the contents of open access textbooks can be freely used, reused, revised, remixed and customized. In essence, open access textbooks can be characterized in the following aspects:

- They are freely available for use and adaptation.
- They invariably consist of digital materials. The contents can be delivered in many formats, including web, audio, e-reader and printed versions.
- They are coherent in contents and are aligned to particular curricular guidelines and standards, and can be customized to meet individual needs.
- Their copyrights are governed by the Creative Commons or similar license which clearly states a list of permissions by the authors.

In principle, the baseline rights allow users to use the textbooks without compensating the authors, copy the textbooks with appropriate credit to the authors, distribute the textbooks non-commercially, and shift the textbooks into another format. Through Creative Common licenses, authors can further grant users the rights to add, remove or revise the textbook contents, often on the condition that derivative works must have the same licenses. Users may be granted the rights to copy and distribute the textbooks without given credit to the authors and/or use the textbooks commercially (EDUCAUSE, 2011).

In North America, vast amount of OER for higher education have been developed. The innovations are now diffusing to textbooks for primary and secondary schools. Some successful textbook projects are quoted as follows.

- College Open Textbooks (2012) aims at driving awareness and advocacy for open access textbooks, training teachers to adopt open resources, conducting peer review, and growing online professional networks which support authors to share the resources. The project has a website containing hundreds of tertiary-level open access textbooks. It also developed a detailed guide for adopting open access textbooks and creating associated teaching and learning materials.
- Connexions (2012) is a dynamic system consisting of an educational content repository of educational materials and textbooks. More than 19,000 learning objects or modules in mathematics, science, history, English, psychology and sociology are available in the repository which is accessed by over 2 million

people of all ages per month. Materials and textbooks can be easily downloadable to almost any mobile device for use anywhere and anytime. Institutions and schools can also order low cost hard copy sets of the materials and textbooks.

- In 2009, California planned for a state-approved list of standards-aligned and open-source digital textbooks for high schools. This initiative, called California Free Digital Textbooks Initiative (2012), reviews the existing free digital textbooks which could be used in California's classrooms. It has stipulated 16 free digital textbooks for high school mathematics and science classes, alleged to have met at least 90% of the California's academic standards. At present, it offers open access textbooks on 47 subjects, each of which covers several grades.
- CK-12 FlexBook (2012) is a non-project organization with a mission to reduce the cost of textbooks for K-12 market both in the United States and worldwide. Using an open-content and web-based collaborative model, CK-12 intends to create re-mixable texts packed in 30+ open textbooks for high schools.
- The Open Access Textbooks project (2012) is a two-year initiative to create a sustainable model for the discovery, production and dissemination of open access textbooks. Funded by a grant from the Fund for the Improvement of Post-Secondary Education, this project builds on lessons learned in open access textbook efforts across the United States and seeks to create a collaborative community to further sustain the implementation of open access textbooks.
- Flat World Knowledge (2012) claims to be the world's largest publisher of free and open college textbooks. Its books are written by leading experts and are peer-reviewed, edited and highly developed. They are supported by test banks, Powerpoint notes, instructor manuals, print desk copies, and knowledgeable service representatives. Its whole stock is completely free online. The texts come with integrated audio, video, interactive features, and powerful search capabilities.
- Khan Academy (2012) is a not-for-profit organization with a goal of changing education for better by providing free educational resources to anyone. At present, it has over 2,400 videos as well as thousands of exercises covering K-12 mathematics and science subjects such as biology, chemistry and physics, and reaching into the humanities with playlists on finance and history.
- Project Gutenberg (2012) offers over 33,000 free e-books to download on PC, iPad, Kindle, Note, Sony Reader, iPhone, iPod Touch, Android or other mobile or cell phones. No fees are required. All of its e-books are quality assured, and previously published by bona fide publishers. The project has digitized and diligently proof-read them with the help of thousands of volunteers.

Open access textbooks offer many advantages. First, they are free. Even when hardcopies are ordered, students need to pay only the basic printing costs. Second, rapid revisions and timely updates of the textbook contents can be made efficiently. Teachers and students need not wait long for the revised textbooks, as the revisions and updates can be made online for instant accesses. Third, open access textbooks allow easy adaptation and modification to cater for the students' learning difference. Teachers may select and customize the textbooks to fit specific teaching and learning

needs of individual groups. Fourth, they can be easily accessed online that supports active and flexible learning. Fifth, as open access textbooks are in digital forms, they are readily available for use with multi-media elements. Students' learning experience can be enriched.

On the other hand, a number of challenges have to be tackled for the successful adoption of open access textbooks. As the authoring of open access textbooks are on voluntary basis, there requires a substantial group of enthusiastic contributors who are willing to produce the textbook contents, including the authoring, revision and review of the contents. Open access textbooks are by nature OER that allow revision, remix and redistribution. Hence, the quality of textbooks, especially after each revision, should be well assured. This requires a system for continuous quality assurance and control. Another challenge is to establish a sharing culture in the community, where teachers and students are willing to share their resources with others. Though difficult to achieve, this is especially important as the sharing of resources is the core concepts of OER.

3 Implementation of Open Access Textbooks

In this section, we propose a solution for the implementation of open access textbooks. It essentially has four components. The first component is a platform for hosting the open textbooks. The second component is the textbook contents. The third component is a system for assuring the quality of textbooks. The fourth component is the support for continuous cultural building and capacity building.

3.1 Open Access Textbook Platform

The open access textbook platform serves many functions. First, it provides a repository for hosting the textbook contents and resources. Teachers can select appropriate textbook contents and resources, and customize them to meet specific teaching and learning needs. Second, it supports a two-way interactive and iterative process, whereby teachers can download, revise, remix and upload contents. The built-in architecture would anticipate and accommodate on-going growth of contents driven by the bottom-up involvement of an ever expanding body of users, stakeholders and volunteers.

Moreover, the platform allows users to download and print out the selected and customized textbook contents. It also allows users to send online requests to printing houses for mass printing of the textbooks. Besides, electronic versions of the selected customized textbooks are available to support online learning and mobile learning. The platform also provides a function for schools and teachers to generate an individual school site to house the selected and customized textbooks and resources.

3.2 Open Access Textbook Contents

The repository of textbook contents include both newly developed open access textbooks and those open access textbooks and OER which are already available

elsewhere for possible adaptation by teachers and students. For the development of new open access textbooks, the following strategies can be applied.

- *Aggregating and selecting from the Web relevant and usable resource materials.* This saves users tremendous time and efforts on sifting through the massive information online and removes uncertainty of the relevance to their teaching and learning.
- *Borrowing and adopting open resources for reuse, revision and redistribution by Creative Commons Licenses.* Many of these open resources are specifically developed and comprehensive for teaching and learning, albeit for different curricular and national standards. They can be translated, easily modified and adapted as a fast-track and economical way of content development.
- *Enlisting the support of practitioners to cooperate and collectively develop the contents and resources for both individual and common needs.* A substantial number of schools and institutions should have already engaged in creating teaching resources in-house. Mutual cooperation would provide some extra incentives, and reduce the workload of single-handed development by individuals who are scattered among various educational organizations.
- *Deploying and recruiting professionals and experts to create original content where necessary.* Like the traditional textbook development process, textbooks can be developed by a team of recruited professionals and experts.

3.2 Quality Assurance System

Open access textbooks are free learning resources available to anyone. To alleviate the worries and scepticism over the quality of free learning resources, a quality assurance system should be set up and overseen by a team of subject experts, editors and education technologists to monitor the textbook development process, assess the quality of textbooks, and review each item admitted to the system. These professionals take the role of co-authors as well as gate-keepers for the quality of the textbooks. The textbook contents would be continually reviewed, updated, improved and enriched with reference to the ratings and feedback gathered online and offline. Apart from internal quality procedures, the following recourses should be in place:

- *Peer review.* Where appropriate, the developed contents are forwarded to individual peers or groups from professional organizations, by voluntary or paid service.
- *Government review panels.* In case of open access textbooks for primary and secondary education, the final products would be submitted for assessment by Government's review panels of school textbooks.
- *Open review and rating.* There should provide an opportunity for teachers, educators and other users to review and rate the open access textbooks in an open way. Such transparency helps identify shortcomings, ensure the effectiveness of the particular resources and in turn further bolster the quality.
- *Systematic evaluation and research.* There are institutions and schools which have the necessary expertise to carry out systematic studies and timely research to evaluate the outcomes and assess the level of satisfaction.

3.3 Continuous Culture and Capacity Building

Coherent groups of potential contributors and beneficiary schools and organizations, which subscribe to the spirits and principles of OER, should be established to share expertise, input manpower, coordinate efforts, and spread the knowledge in support of the continuous development of open access textbooks and resources at societal level. At the individual level, those interested and qualified authors, editors, teachers from primary and secondary schools, and professors from tertiary institutions could join the developers and contributors of open access textbooks at different levels.

Training should be provided to teachers and professors, mainly on the teaching practices with the use of open access textbooks and other learning resources. The training can help them master the skills to produce these open access textbooks and learning resources. It can nurture their abilities to search, filter and select appropriate and legitimate learning resources on the Internet as well as to write, edit and digitize materials for textbook contents. It can also explain what is good instructional design, how quality is upheld and what tools and techniques should be used.

In addition, there should be a public platform providing services primarily to teachers and students, and any other users with the enthusiasm to collaboratively contribute to the textbook contents, whether by way of authoring, editing, enriching, commenting, amending or remixing. The expanding community and capacity thus generated would ensure a clear understanding of quality standards and requirements, and provide ample energy, relevant experiences and favourable conditions for the continuous improvement of the programme and achievement of successful outcomes.

4 Sustainable Development of Open Access Textbooks

As mentioned earlier, the successful adoption of open access textbooks depends on at least three factors, namely, contributors of textbook contents, high quality of textbooks, and the culture of sharing education resources. Strategic measures should be in place in order to sustain its long-term development. This section discusses these measures in the steering, governance, community, culture and capacity building, and the on-going development and maintenance of open access textbooks.

- *To garner public support of open access textbooks.* A group of supporters is required. Institutional supports should be solicited. Public seminars should be arranged in order to raise public awareness and to promote the use of open access textbooks. It is believed that substantial savings and flexibility to adjust to students' learning needs, arising from open access textbooks, is a strong motivation for users' participation as well as a vehicle to obtain public support.
- *To form a group of volunteers.* There is much anecdotal evidence showing that it is possible for volunteerism alone to drive a massive project, such as Wikipedia, and Linux. It is believed that the vision of social equity and the motivation of knowledge sharing as well as the benefits of widened dissemination would be sufficiently strong drivers to enlist volunteers to participate as authors, editors and reviewers to offer some services for non-monetary rewards and recognition.

- *To solicit philanthropic and community support.* Some local and overseas foundations, charitable bodies or commercial organizations have pledged their support to sustain OER projects, such as Bill Gate Foundation and Hewlett Foundation. Some open and free online services, such as Wikipedia, manage to survive and flourish with mass donations from individuals. In the long-term, it is necessary to solicit philanthropic and community support for open access textbook development.
- *To provide training for teachers.* Training workshops would be provided to teachers and practitioners, mainly on the use of open access textbooks, the associated teaching materials and other OER. These aim to nurture teachers' abilities to select appropriate and legitimate open access textbooks and other learning resources, and write, edit, revise, remix and digitize the contents. Instructional design and quality assurance practices would be covered.
- *To launch a forum for practitioners of open textbooks.* Online forums for teachers and practitioners of open textbooks would be organized. It serves to provide a 7x24 platform for teachers and practitioners to share views, express opinions and discuss issues on open access textbooks and OER.
- *To sustain the open access textbook platform.* On-going maintenance of the platform, including technical system administration, account administration, and regular system updates, for the platform is essential to ensure its proper and smooth running. On-going technical and user support, such as hotline and helpdesk, is also required for answering technical queries from end-users.
- *To maintain the quality of open access textbooks.* On-going maintenance of the developed textbooks, including annual evaluation, review and revision, is also required in order to assure the quality of textbooks. As multiple versions of an open access textbook are allowed, versioning need to be properly controlled. Reviews would be done both by experts, users and peer review groups.
- *To review the scope and identify the need for new open access textbooks.* From time to time, reviews would be carried out on the scope of available textbooks, and the need of new textbooks should be identified. On-going enhancement of the developed open access textbooks is equally important. This includes major revision, and addition of OER associated with the open access textbooks.

5 Conclusion

With the rapid development and wide acceptance of OER, we found the opportunities of using open access textbooks to replace, or at least to complement, the traditional printed textbooks for good reasons. Apart from resolving the pressing issues of high price and frequent revisions of textbook, which has been perplexing the students and educators for years, there are pedagogical advantages such as on catering for the students' learning differences, promoting flexible and active learning, and enriching the students' learning experience with multimedia elements. In North America, there are many successful projects that prove the effectiveness of OER for teaching and learning. It is therefore a corollary that the same concepts can also be applied to school textbooks.

As a revolutionary change in practices, the successful adoption of open access textbooks has a number of anticipated challenges, such as soliciting the contributors of textbook contents, assuring the quality of textbooks, and establishing a culture of sharing education resources. Continuous public support and user participation are crucial in order to sustain the long-term development of open access textbooks. In this paper, we elaborate the concepts of open access textbooks, discuss the opportunities and challenges, and propose a solution for the implementation together with some strategic measures for the sustainable development. Overseas successful projects are referenced and discussed.

We are pleased to see that the sharing of resources on the Internet is becoming a common practice. Wikipedia, iTunesU, Curriki and Open Courseware are some good examples of sharing information resources and learning resources. Linux, Moodle and open source codes are other good example of sharing software resources. Today, the development of many intellectual properties have shifted to a paradigm of collective and cooperative development with the open access and shared resources. It is undeniable the advent of information and communication technologies have changed the traditional practices in different walks of life. Teaching and learning practices would not be the exception, and we optimistically believe that open access textbooks would be the order of the day soon.

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