The Open Textbooks for Hong Kong: From Conceptualization to Implementation

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Abstract. As a specific type of open educational resources, open textbooks can be used as official textbooks for classroom-based teaching and learning in both universities and schools. The first official open textbook system just came into existence in Hong Kong although open textbooks have been adopted in North America for a decade. This paper describes the open textbook system for Hong Kong from its conceptualization to implementation. In this paper, the problems of traditional textbooks in Hong Kong that motivated the development of open textbooks are addressed. The development of this open textbook system is described, where the opportunities and challenges are discussed. Based on the lesson learned, an open textbook system should comprise four essential components, namely, a platform for operating open textbooks, a repository of open textbook contents, quality assurance mechanisms, and the continuous capacity building for users. In order for open textbooks to be sustained in the long term, public support should be garnered. Volunteer groups should be formed while continuous philantropic support should be solicited. From time to time, evaluation and reviews should be conducted for continuous improvement.

Keywords: Open textbook · Open educational resource · Open textbook system · Open license · E-Learning

1 Introduction

In the past two decades, open educational resources have evolved as a major source of educational materials for teaching and learning. They are "digitized materials offered freely and openly for educators, students, and self-learners to use and re-use for teaching, learning and research" [1]. They can be user-generated contents such as Wikipedia [2] and Wikibook [3], institution-led open courses such as Open Courseware [4], EdX [5] and Coursera [6], online repositories of learning materials and e-books such as Connexions [7], Open Access Textbooks [8] and Flat World Knowledge [9]. There are four categories of open educational resources, namely, open courseware, open online courses, open e-books, and open-source software and tools to support teaching and learning [10].

As a specific type of open educational resources, open textbooks are by nature open access e-books that can be used as official textbooks for classroom-based teaching and

learning in universities and schools [11, 12]. The key difference is that the open textbooks adopt open licenses whilst the traditional textbooks do not. These open licenses allow users to reuse, revise, remix and redistribute. Widely adopted by many open textbook systems, Creative Commons offer different open license options, specifying whether the textbook contents can be revised or not, redistributed or not, shared alike or not, and for non-commercial or not [12–14].

Open textbooks are freely available for use and adaption. As the open licenses can allow users to revise and remix the contents, open textbooks can be freely customized to cater for individual learning needs. Invariably consisting of digital contents, open textbooks can be delivered in many formats, including web, e-reader, and printed formats. Multimedia elements and animated features can be included as appropriate, for example, audio and video clips for learning languages. When compared to other freely available online learning materials and objects in the Internet, open textbooks are self-contained e-books. They are well-organized and coherent in contents, and follow particular curricular guidelines and standards.

Inevitably, open textbooks have many advantages over the printed textbooks. In early 2000s, the ideas of open textbooks started to evolve, not only for combating the high price of textbooks but also for promoting knowledge creation and sharing. Open textbooks have been used in universities and schools in North America for more than a decade. Connexions [7], Open Access Textbooks [8] and Flat World Knowledge [9] are some well-known open textbook projects. Although the open textbooks are free of charge, they meet the necessary academic standards, for example, the open textbooks from the California Free Digital Textbooks Initiatives have met over 90 % of the required academic standards [15].

In Hong Kong, where almost all primary and secondary schools are still using the traditional printed textbooks for classroom-based teaching and learning, the issue of high price of textbooks and their associated learning materials has been perplexing the community for many years. In 2012, the author together with a number of academic peers at the Open University of Hong Kong formed a team to explore the possibility of developing open textbooks for Hong Kong [11–14, 16]. After several rounds of investigations and proof of concepts, the team successfully solicited a generous funding from the Hong Kong Jockey Club Charities Trust for developing the first official open textbook system in Hong Kong. It covers open textbooks for primary and secondary schools as well as universities and post-secondary institutions [17]. This paper describes the system, from conceptualization to implementation. It begins with stating the problems of printed textbooks that motivated the development of open textbooks. The development of this open textbook system is described, where the opportunities and challenges are discussed. The experience in implementing open textbooks for Hong Kong is shared from an insider's perspective.

The rest of this paper is structured as follows. Section 2 introduces the ideas of open textbooks and open licenses. Section 3 describes the first official open textbook system for Hong Kong, called the Open Textbooks for Hong Kong. Section 4 shares the experience in implementing the open textbook system. Section 5 concludes this paper with a discussion on how open textbooks can be sustained.

2 Open Textbooks and Open Licenses

With the advent of the Internet technologies, open educational resources are made available for sharing and adaptation. Through open licenses, the contributors of open educational resources grant users the rights to reuse, revise, remix and redistribute the resources. Users can freely use these resources, make any revision and improvement, and in turn, share the revised or remixed resources to others.

Open textbooks are essentially a specific type of open educational resources which can be used as official textbooks for classroom-based teaching and learning [10]. They are by nature e-books that can be characterized as follows. First, they are freely available for use, re-use and adaption. Second, they consist of digital contents which can be delivered in many formats, where multimedia and animated features can be included. Third, they are coherent in contents and are aligned to particular curricular guidelines and standards, and can be customized to meet individual learning needs. Fourth, the copyrights are governed by open licenses, such as Creative Commons which clearly defines a list of rights and permissions.

It has been an undeniable fact that online resources have been proliferating in an exponential scale. A vast amount of open educational resources are available from the Internet. In early years, these open educational resources were mainly for university or college studies. The resources were rather scattered and unorganized. As time went by, online platforms were developed for organizing these resources as a consistent whole. Wikipedia [2] and Wikibooks [3] are representative examples. Open e-books then evolved. They are diffusing to textbooks, not only for universities and colleges but also primary and secondary schools, for example, Connexions [7], Open Access Textbooks [8] and Flat World Knowledge [9].

In many prior studies, open textbooks offer many advantages over the traditional printed textbooks [11–13, 18–20]. First, they are freely available from the Internet. No copyright charge is required even the users choose to print them in hard copies. Second, without worrying about the copyright issues, they can be readily revised and customized to meet the individual learning needs. Third, the practice is conducive to knowledge creation and sharing. Fourth, as they are in electronic format that can be easily re-distributed over the Internet, subsequent revisions can be quickly deployed. Also, online and interactive learning objects, multimedia components and animated features can be easily incorporated.

Open licenses enable the contributors of open textbooks to grant users the rights to reuse, revise, remix and redistribute the textbook contents. Creative Commons define the open licenses for users of open textbooks. There are four essential attributes for open licenses, namely, attribution, non-commercial, no-derivatives, and share-alike [21]. Attribution means that users may copy, distribute, display and make derivative work if they give the author the credits. Non-commercial means that users may copy, distribute, display and make derivative work only for non-commercial purposes. No-derivatives means that users may copy, distribute and display but not make derivative work. Share-alike means that users may distribute derivative work under a license identical to the license that governs the original work.

Based on the different possible combinations of the four essential attributes, a total of six license types are derived. They represent six options of open licenses that suit different purposes and usages for the users. Table 1 list these open license options under Creative Commons.

Table 1. List of open license options under creative commons.

Codes	License types	Rights
BY	Attribution	Users can distribute, remix, tweak, and build upon the author's work as long as they credit the author for the original creation.
BY-SA	Attribution + Share-alike	Users can remix, tweak, and build upon the author's work even for commercial purposes, as long as they credit the author and license the new creations under identical terms.
BY-ND	Attribution + No-derivatives	Users are allowed for redistribution as long as it is passed along unchanged and in whole, with credit to the author.
BY-NC	Attribution + Non-commercial	Users can remix, tweak, and build upon the author's work non-commercially, and although the new work must also acknowledge the author and be non-commercial, they do not have to license the derivative work on the same terms.
BY-NC-SA	Attribution + Non-commercial + Share-alike	Users can remix, tweak, and build upon the author's work non-commercially, as long as they credit the author and license the new creations under the identical terms
BY-NC-ND	Attribution + Non-commercial + No-derivatives	User can download the author's work and share them with others as long as they credit the author, but they can't change them in any way or use them commercially

Source: Website of Creative Commons [21].

3   Open Textbooks for Hong Kong

This section describes the first official open textbook system or platform in Hong Kong, called the Open Textbooks for Hong Kong [17].

3.1   Background of the Project

In Hong Kong, the traditional printed textbooks are widely adopted in primary and secondary schools. The textbook publishers used to revise the textbook contents and raise the price every one or two years. Textbooks cannot be reused after one or two years because of the revisions, and students need to pay high costs for new textbooks. For many years, the issue of high price of textbooks and their associated learning materials has been perplexing the community.

In 2012, the author together with a number of academic peers at the Open University of Hong Kong initiated a project for developing open textbooks in Hong Kong [17]. With the funding support from the Hong Kong Jockey Club Charities Trust, the project commenced in 2013, and took three years to complete. It was formally launched in January 2016.

The project addressed a number of problem issues on the printed textbooks in Hong Kong, as listed below.

- The printed textbooks contents are rather static. They are costly to update, and become even more expensive when bundled with the associated learning materials such as multimedia components.
- The printed textbooks are not flexible enough to meet the specific learning needs because they cannot be customized for a variety of learning objectives and contexts in a timely manner.
- Curricular developments and reforms exerted extra pressure on publishers. Their conventional business model in publishing textbooks is unfavourable for meeting the modern demands of a more diverse curriculum and catering for mixed students' abilities and variable school preferences.
- The publishers are not willing to take full advantage of digital technology and put the learning materials online. They are wary of piracy and uncertain about copyright acquisition and protection.
- There is a lack of platforms for teachers to develop and share their developed teaching materials and resources with the peers.

The project attempted to address the problem issues by introducing a new approach to textbook development – developing open textbooks using open licenses. The target users are the teachers and students as well as the general public. The scope covers the primary and secondary schools, post-secondary institutions and universities. There are four components, namely, an online platform, a repository of textbook contents and the associated learning materials, quality assurance mechanisms, and the continuous capacity building for users [12, 22, 23]. They are described below.

3.2   Online Open Textbook Platform

An online platform is required to serve as the interfaces for users to access the open textbooks. Different from typical learning management systems [24, 25], the online platform serves at least three functions [22, 23]. First, it provides a repository for hosting the textbook contents for online accesses. Second, it allows users to select appropriate textbook contents and customize them to meet specific learning needs. A two-way interactive and iterative process is supported, for users to download, revise, remix and upload the revised or remixed contents. Third, although the online version of the textbooks may be sufficient for teaching and learning, online requests can be made to some printing houses for mass printing of the selected textbooks. Figure 1 shows the homepage of Open Textbooks for Hong Kong (2016).

The platform adopts a technical infrastructure comprising a contents server and a media server [16]. A learning management system and a content management system

Fig. 1. Homepage of the open textbooks for Hong Kong.

collaboratively operate on this infrastructure. Learning object database, user profile database and media repository database are accessed through a retrieval engine. Data are organized and formatted as XML so that various formats such as PDF, SCORM, e-Book and e-Pub are supported. A website is used to serve as the user interfaces for users to access the open textbooks through the Internet.

3.3   Open Textbook Contents and Learning Materials

A repository of textbook contents and learning materials is the core of an open textbook system. These contents and materials include the newly developed contents as well as the existing resources which are already available elsewhere for reuse and adaptation. According to Cheung et al. [12, 13], the following four strategies can be taken in developing the open textbook contents and learning materials:

- to aggregate and select relevant and usable open educational resources which may be scattered and unorganized;
- to borrow and adopt some existing readily available open e-books or materials under some open license schemes;
- to enlist the support of practitioners to cooperate and collectively develop the open textbook contents and learning materials;
- to deploy and recruit professional writers to create original textbook contents and learning materials; and

In the Open Textbooks for Hong Kong, a combination of the above strategies has been taken in preparing the open textbook contents and learning materials. The open textbooks are grouped under the following categories.

- *Open textbooks at primary and secondary education level.* Professional writers were recruited to create the original textbook contents and learning materials. Relevant and usable open educational resources were also adopted to enrich the contents. Figure 2 shows a list of Primary 3 English textbooks.
- *Open textbooks at post-secondary level.* Some existing readily available educational resources and learning materials were adopted. Adaptation has been made to cope with specific learning needs. Figure 3 shows as list of English modules for YiJin Programme.
- *Open textbooks at university level.* The existing readily available open e-books were adopted. Depending on the open licenses used, appropriate adaptation has been made, mainly for formatting requirements. Figure 4 shows a list of open textbooks in Arts and Humanities for universities and colleges.
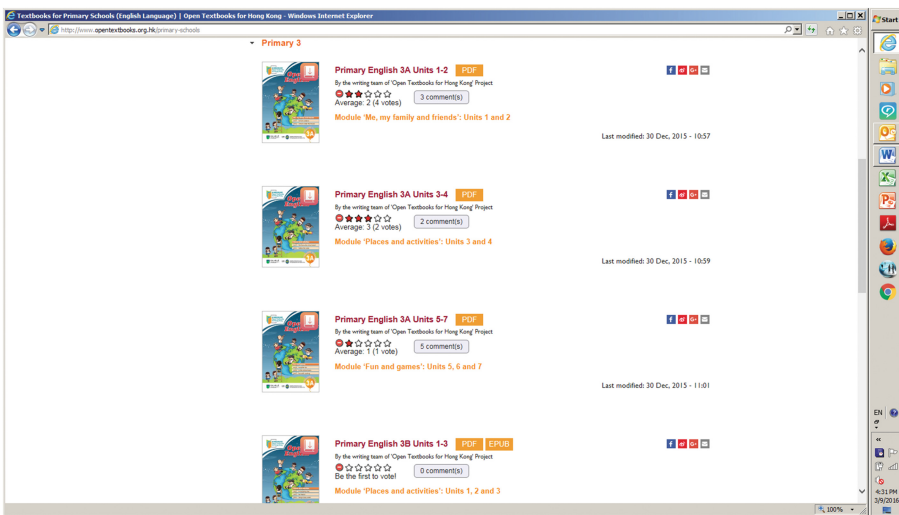
Fig. 2. List of primary 3 English textbooks.

3.4   Quality Assurance Mechanisms

Like other open educational resources, open textbooks are free learning resources available to anyone. Quality assurance mechanisms should be in place to ensure the quality of the open textbooks so as to alleviate the worries and skepticism over the quality of free learning resources. Different quality assurance mechanisms can be adopted, including open and public review, peer professional review, and government or official review.

The following quality assurance mechanisms have been applied.

- For open textbooks at primary and secondary education levels, the prevailing guidelines for school textbooks set out by the government are tightly followed. After going through a serious of rigorous procedures, all these open textbooks are now put under the government's recommended booklist.
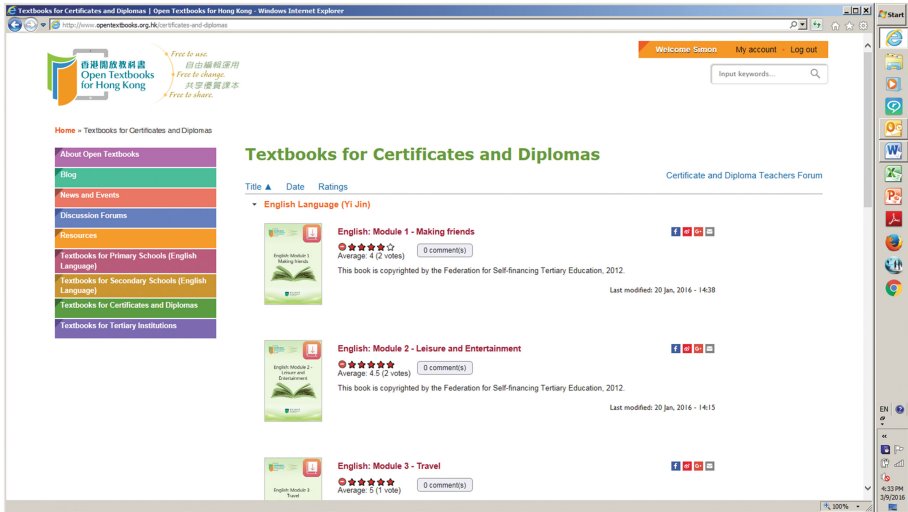
Fig. 3. List of English modules for Yijin programme.
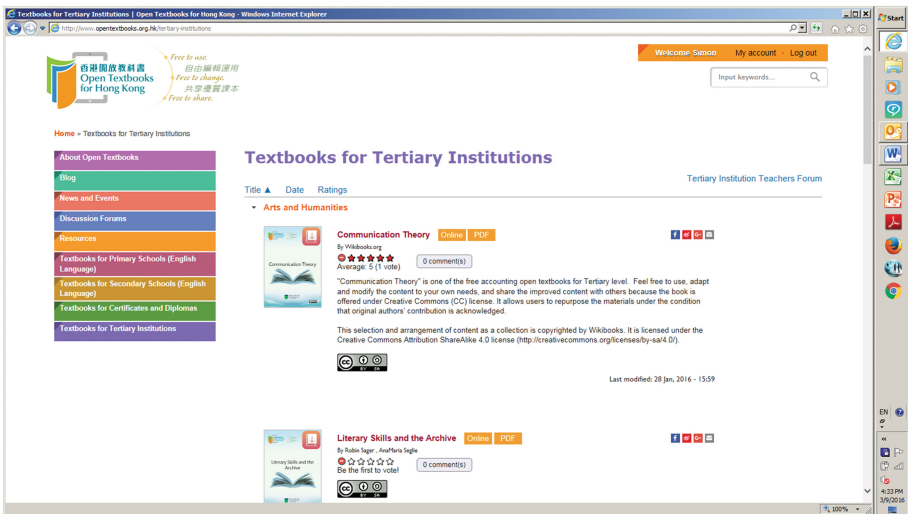

Fig. 4. List of open textbooks in arts and humanities for universities and colleges.

- For open textbooks at post-secondary and university levels, peer professional review must be conducted before release. Reviewers were the peer academic and professional experts in the relevant subjects or fields. By invitation, they did the review in a voluntary basis. In addition, open and public reviews are also allowed. Ratings and comments can be posted for reference.

Besides, a number of systematic studies have been conducted by the Project Team to evaluate the learning effectiveness and learning experience.

3.5   Continuous Capacity Building for Users

As one of the key success factors for the adoption of open textbooks, training should be provided to users, such as the teaching practices with open textbooks [12, 13]. Training should also be provided on the production of open textbooks, such as on authoring digitized materials for textbook contents, and selecting and adapting some legitimate open educational resources. Instructional design and quality assurance for open textbooks should also be covered. Besides, there should be a public platform for users to share experience and exchange ideas.

In the Open Textbook Project for Hong Kong, discussion forums separately for primary school teachers, secondary school teachers, post-secondary teachers and university teachers are established for these peer-groups to exchange ideas and share knowledge and experience, as shown in Fig. 5. Besides, regular seminars, talks and workshops are organized for both the prospective and existing users. These are useful for maintaining a strong user community of open textbooks as well as for building up a culture of using open textbooks in Hong Kong.

Fig. 5. Discussion forums in the open textbooks for Hong Kong.

4   Discussion and Conclusion

Following the rapid development and wide acceptance of open educational resources, open textbooks have evolved as an another source of textbooks for classroom-based teaching and learning. Not only serving the same functions of the traditional printed textbooks, open textbooks also offer many advantages. They are freely available for use and adaptation. Using open licenses, open textbooks can allow users to revise and remix the contents to cater for individual learning needs. These revised and remixed textbooks can be shared for other users. Similar to Wikipedia and Wikibook, open

textbooks would be continuously expanded and improved through open sharing. The success of many open textbook systems and platforms in North America has clearly shown this promising outcome.

In Hong Kong, open textbooks are still in the incubation stage. Being one of the initiators of the first official open textbook system in Hong Kong, the author and his team members were lucky to receive generous funding supports in making the open textbooks become a reality in Hong Kong. Taking three years to turn the concepts into actual implementation, valuable experience has been earned. This paper describes this Open Textbooks for Hong Kong project, and shares our development experience from an insider's perspectives. Based on our experience, an open textbook system should have four essential components, namely, an online operating platform, a repository of open textbook contents, quality assurance mechanisms, and the continuous capacity building for users.

Although open textbooks have been adopted in North America for over a decade, open textbooks are very new to the teachers and students in Hong Kong. Being a revolutionary change in practices, the successful adoption of open 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 any open textbook system, strategic measures should be in place in order to sustain its long-term development.

The following measures can be taken in the steering, governance, community, culture and capacity building, and the on-going development and maintenance of open textbooks. First, public support of open textbooks should be garnered. Second, volunteer groups for open textbook development should be formed. There is much anecdotal evidence showing that volunteerism along can drive a massive project such as Wikipedia and Linux. Third, continuous philanthropic support should be solicited, such as the support from Hong Kong Jockey Club Charities Trust in development the Open Textbooks for Hong Kong. Fourth, quality assurance mechanisms for both the technical platform and the open textbook contents should be enforced. Fifth, from time to time, reviews should be carried out to evaluate the learning outcomes and to seek improvement for enhancing learning effectiveness.

This paper provides a useful reference for practitioners to develop open textbook systems for Hong Kong.

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