Developing an OER Website and Analyzing Its Use during the COVID-19 Pandemic

建置開放教育資源網站並分析其在新冠肺炎疫情期的使用情形

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Abstract

The outbreak of COVID-19 has pushed many teachers and students to change their traditional ways of teaching and learning, which also required them to become more familiar with using various online resources. UNESCO emphasized that more quality open educational resource (OER) materials should be made available to teachers and students. Compared to many commercial sites, OERs have been constantly criticized for their poor quality (International Commission on the Futures of Education, 2020). However, so far, insufficient attention has been paid to the improvements and promotion of OERs. To fill this important gap, this paper first introduces how we use various computer-assisted language learning (CALL) and natural language processing (NLP) technologies and the free resources around the world to develop a comprehensive open-source English learning site called Cool English. The content and major functions of this site are first introduced. An investigation on how the site helped teachers and students during the COVID-19 time (from February to July 2020) was carried out by analyzing the various resources used by teachers and students. In addition, we also discuss several problems and challenges of using this website and other online resources. Through the descriptions and analyses of this website, researchers might be able to gain some experiences in developing and promoting OER sites for English language learners and teachers.

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摘要

COVID-19的爆發促使許多老師和學生改變他們傳統教與學的方式，也使得他們必須變得更加熟悉使用各種線上資源。聯合國教科文組織強調我們應向教師及學生們提供更高質量的開放教育資源(OER)。但與許多商業站點相比，OER的低質量一直受到批評。但是，目前為止，對於如何改進和推廣開放式教育資源的研究並不多。為了填補這個重要缺口，本文首先介紹我們如何使用各種計算機輔助語言學習(CALL)和自然語言處理(NLP)技術以及應用世界各地免費的資源開發一個全方位的開源英語學習網站。首先，本文介紹該站的內容和主要功能，並同時調查及分析在COVID-19期間師生是如何使用各種網站上的資源，藉以瞭解此網站如何幫助師生。此外，我們還討論了師生使用本網站的幾個問題和挑戰。通過詳細介紹網站建置過程和分析此網站於COVID-19期間使用情形，此研究可幫助相關研究人員獲得為英語學習者和教師開發和推廣OER網站的一些經驗。

Keywords Open educational resources (OERs) · English learning · COVID-19 · CALL

關鍵詞 開放式教育資源 (OER) · 英語學習 · 新冠肺炎 · 電腦輔助語言學習

The Outbreak of COVID-19 and OERs

In January 2020, the initial outbreak of the SARS-CoV-2 coronavirus in China spread rapidly around the globe. The impact of the COVID-19 pandemic radically reshaped many aspects of people's lives. For education, governments temporarily closed many educational institutions in an attempt to prevent the spread of the virus. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), these closures have had a huge impact on more than 60% of the world's student population [14].

Given that online learning played such an important role during this difficult period, UNESCO provided recommendations to help ensure that learning could be continued during this period [15], such as ensuring the readiness of essential equipment and facilities (e.g., internet connection) for online learning, providing limited number of applications/platforms with appropriate learning materials and adequate support (e.g., brief training of how to use) to students and parents, and tracking and assessing students' learning process by tests/exercises. Moreover, UNESCO also proposed nine key ideas for public action on education in a post-COVID-19 world. One of these ideas is to:

“[m]ake free and open source technologies available to teachers and students. Open educational resources and open access digital tools must be supported. Education cannot thrive with ready-made content built outside of the pedagogical space and outside of human relationships between teachers and students. Nor can education be dependent on digital platforms controlled by private companies.” [16, p. 6]

UNESCO's recommendations and ideas for education in a post-COVID-19 world thus highlight the need for providing teachers and students with open educational resources and digital tools via online platforms that offer users with clear guides, well-organized learning materials, and powerful learning process tracking systems.

Before COVID-19, UNESCO had already highlighted the importance of open educational resources and tools. However, some problems with OERs still exist. There are limited open educational resources and tools available for teachers and students

globally. In addition to the limited number of OERs, researchers have pointed out that OERs have been constantly criticized for their poor quality [17]. Given the strong need for more quality OERs, it is evident that more studies on OERs should be conducted. In the following section, some recent studies are reviewed.

Previous Studies on OERs for Language Learning

Several studies have proposed specific types of digital resources which can be used for OERs. Some studies [10, 18] focused on the use of corpora. Pérez-Paredes et al. [10] proposed that corpus and natural language processing technology tools can be used for OER as they promote individual and personalized learning. Vyatkina [18] recommended that corpora can be used as open educational resources for language teaching. Various examples in the teaching of German were provided.

Some studies [2, 8, 19] recommended virtual reality technology and massive open online courses (MOOCs). Towey et al. [13] have developed virtual reality open educational resources in a higher education institution. They also discussed their strategies and challenges. Berti [2] also highlighted the importance of virtual reality and discussed the development of virtual reality OER in the teaching of Italian. Two studies pointed out that MOOCs have great potentials as OERs. Motzo and Proudfoot [8] described how they used MOOCs to teach Italian. Zancanaro and Domingues [19] also highlighted the importance of MOOCs for language teaching.

Several other ideas regarding the use of various resources such as OERs have been proposed. Cinganotto and Cuccurullo [3] suggested that OERs and digital tools can drastically change language education, offering many new opportunities for CLIL teachers and trainers. Bellés Calvera and Bellés Fortuño [1] suggested that a tool called Voki can be used as an OER to teach English pronunciation. Voki is an educational tool that allows users to create their very own talking character. Colpaert [4] highlighted the potentials of using big data for language learning and teaching. Thus, it is clear that there are many different types of resources and tools that can be used for OERs.

In addition to these various ideas, some researchers [5–7, 12] have tried to examine the quality and accessibility of OERs. Krajcsó [5] proposed some classification and quality criteria for OERs in the field of foreign language learning. Marcus-Quinn [7] investigated the potential of high-quality OERs for the teaching of English poetry. Lin and Kim [6] were concerned about the quality of various ESL OERs and whether these resources can be suitable for language learners. Thoms et al. [12] investigated the reasons why teachers would want to use OERs based on a survey on 310 ESL teachers. They found the main reasons for teachers using OERs include the ease of their integration and their ability to cover certain aspects in their courses. However, some teachers indicated that they do not use OERs because it was difficult for them to locate suitable ones and the poor quality of the materials. On the other hand, other teachers pointed out that OERs can make their teaching more interesting because they include more authentic materials and can help better address the needs of their students.

Rets et al. [11] conducted a rigorous study targeting the accessibility of OERs for English learners. They investigated the readability of about 200 English courses from two major platforms. The results showed that more than 86% of these courses were only suitable for advanced learners. This study also discussed the limits of OER and the

possible constraints affecting its wider application. Their findings help to highlight the unsuitability of many existing OERs for lower and intermediate English as a second/foreign language (ESL/EFL) learners. Moreover, learners' language proficiency levels should be carefully considered when choosing to use OER courses.

As can be seen from this brief review of various OERs related to language learning, researchers have proposed many ideas for developing OERs. However, most have focused on the use of one or two types of digital tools and technologies. So far, very few studies have introduced a comprehensive OER site that integrates various types of technologies and resources for ESL/EFL learners. In this paper, we would like to share our experiences in developing a comprehensive OER website for EFL learners and discuss how this open-source website was used during the COVID-19 pandemic. In the following sections, we first introduce how we developed new resources for online learning and how we adopted various web resources to improve our services. Then we move on to examine how this site was used during the COVID-19 pandemic (from February to July 2020).

The Development of the Cool English Site

In Taiwan, English has long been considered a key foreign language. However, since teaching and learning resources diverge between cities and rural areas, students often have very different learning outcomes. Because the gap between cities and rural areas has become increasingly large, the Ministry of Education in Taiwan decided to develop more OERs for students in rural areas. The purpose is to ensure that students in rural areas are able to have easier access to quality English learning materials. Nunan and Richards [9] proposed that learning beyond the classroom is crucial for students to enhance their second/foreign language competence.

In 2014, a research project was granted to support the development of a self-access English learning site for students. It was expected that this free English learning website would help students in remote areas to further improve their English skills since they have very limited access to native speakers and other learning resources. The Cool English project (<http://www.coolenglish.edu.tw>) was developed by a research team in the English department at National Taiwan Normal University. This team included several professors from TESOL, computer sciences, and digital learning. After about 6 years of research and development, this site currently consists of several sections which help students improve various language skills and linguistic knowledge. The site now has three major sections to serve the elementary school, junior high school, and senior high school students respectively.

This website has adopted a wide variety of CALL and NLP technologies. The learning resources include the materials developed by our team and also useful resources we adopted from other internet resources. For listening, a wide selection of interactive animated videos was created for students to watch and immerse in different authentic contexts. There are also listening tools for students to adjust the speech rate, as well as an online dictionary. Furthermore, various open-source videos from Voice of America (VOA) were included in our listening section. A function similar to the commercial site lyrics training (<https://lyricstraining.com>) was developed, in which students can choose their favorite songs and type in the missing lyrics.

For facilitating speaking skills, advanced automated speech recognition technology and AI chatbots were developed. A state-of-the-art automatic speech recognition technology called CALDI (<https://kaldi-asr.org/>) was adopted while an ASR was also developed which can quickly detect learners' pronunciation errors. Moreover, with the help of AIML languages, we also developed various chatbots with text to speech (TTS) technology which can interact freely with ESL students. The highly interactive Google actions was utilized, which can be activated on smart speakers such as Google Home and on any smartphone.

For reading, several hundred multimedia books and quizzes were created. Materials from various websites offering free e-books were acquired and audio for each book added with the help of high-quality TTS technology. Furthermore, various vocabulary exercises and reading comprehension questions were created for each storybook. In addition to traditional e-books, OER world-class comic books like Pepper and Carrot (<https://www.peppercarrot.com/>) were also included. Moreover, many of the reading materials for senior high school students made use of VOA news for English learning.

For vocabulary learning, many different types of theme-based vocabulary exercises were created to allow students at different proficiency levels to practice essential vocabulary items. Moreover, students are able to engage in various types of online word games. For grammar learning, many video tutorials and wide-ranging exercises are provided to enhance students' grammatical competence. There are also many grammar exercises available for self-assessment.

To help students and teachers acquire easier access in finding the supplementary materials for textbooks, the site also offers a complete package for all the lessons in each of the English textbooks currently used in Taiwan. Moreover, the answers and detailed explanations for each official English entrance examination are also provided.

Furthermore, to make English learning more engaging, several types of digital games were also developed. These games include a 3D role-playing game created with Unity tools, HTML5 games, and unity-based English shopping games. These digital games were either developed by our team or purchased/licensed from various internet resources. More recently, teachers are now able to assign students their assignments via our website. Teachers can also track student participation and view their scores for each assignment.

As introduced in previous sections, although this site was created mainly for students in remote areas, a growing number of users from various cities and counties have also begun to use this free website for self-access learning. The number of users of the site have stably increased within the past few years. In mid-2016, the site had only about 20,000 registered users, but by mid-2019, the number of the registered users had reached 220,000.

Cool English Site during the COVID-19 Pandemic

Since Taiwan lies adjacent to China and has a very close relationship with China in various domains, the government responded very quickly to the spread of the coronavirus when the first case in Taiwan was confirmed on January 21, 2020. The Taiwanese government collected various information from the national health care system,

immigration, and customs authorities to better respond to the virus. Taiwan also took several different actions to stop the spread of the disease. Some of these actions include early screening of flights from China and the tracking of individuals.

Because the first case was found during the winter break, the Ministry of Education decided to extend the winter break for 2 weeks to February 25 to avoid the possible spread of the disease. Students were also advised not to attend cram schools since the crowded classrooms were likely to be more contagious. At the same time, MOE still expected students to continue their learning. On February 5, MOE decided to promote the use of online teaching and learning resources by holding a press conference. Before the COVID-19 pandemic, MOE had developed some OER websites for teachers and students. During that time, many people were not particularly interested in using these online resources and tools. Hence, during this difficult period, MOE invited all the major platforms to participate in this meeting so as to emphasize that online learning should be used to limit any interruptions caused by the coronavirus.

When the schools opened in late February, MOE advised all the schools to take cautious steps. Teachers' and students' temperatures needed to be taken before entering schools, and it was made mandatory for masks to be worn at all times. They were advised to avoid crowded rooms and to wash their hands regularly. Fortunately, Taiwan was not seriously impacted by the coronavirus, and all the schools were still able to maintain regular classroom teachings and learnings from February to July.

Since the coronavirus has pushed numerous countries and organizations to develop better quality OERs for students and teachers around the world, our experiences and findings in developing and using the Cool English site should be useful for many interested organizations and teams around the world. Below are the three aspects that will be reported and studied in this paper.

1. Did the number of users (students and teachers) increase during the initial several months of the COVID-19 pandemic?
2. What were the most popular resources used by students and teachers?
3. What were the challenges and difficulties in accessing and using this OER site? Were there any improvements that needed to be made?

To answer these questions, we extracted the user data collected on our website during the 6 months (from February to July 2020) to perform a detailed analysis.

Results and Discussion

The Growth of Users during the COVID-19 Pandemic

Although schools in Taiwan operated smoothly during the aforementioned 6 months, after checking the registration records of the Cool English site, it was found that the number of users (students and teachers) had substantially increased during the 6 months. As shown in Fig. 1, from January 2018 to January 2019, registered users increased from 107,522 to 187,306; and from January 2019 to January 2020, users increased from 187,306 to 278,537. However, during the COVID-19 period, users increased from 278,537 to 410,007 within only 6 months. If we calculate the growth rate of registered

Fig. 1 Total number of registered users of Cool English

users, the number of users almost tripled compared to the previous 2 years. As for teachers, approximately 2000 new teachers registered for teacher's accounts during this period of time. This is shown in Fig. 2. With a teacher's account, school teachers are allowed to assign students assignments via our website. They can also easily track student participation and view their scores for each assignment. However, it should be noted that some teachers did not apply for teachers' accounts since they do not think they would need to monitor students' online performances. Instead, they only used a regular user account to log in to introduce the learning content and tools to students.

The most Popular Sections during the COVID-19 Pandemic

Since there are many different resources and tools on our website, it is always useful to better understand users' needs. During the initial period of the COVID-19 pandemic, the top 10 sections used by teachers and students are shown in Fig. 3. As can be seen, listening, vocabulary, and reading were the most popular categories chosen by our users. Many students also decided to use the remedial learning materials and HTML5 games. The most popular materials for listening were the animated videos. The second were the interactive vocabulary exercises focusing on the most commonly used words.

Fig. 2 The number of registered teachers between February and July 2020

Fig. 3 The top 10 sections used by students and teachers

And the third were the reading materials adopted from another OER site storyweaver. These books are also supplemented with audio files, which are generated by high-quality TTS voices. Moreover, the remedial learning materials and HTML5 games were also widely used by students and teachers.

Another major strategy used to promote this site was to have a nationwide contest on various language skills. We prepared some exercises for each contest. Awards were given to students who performed well in completing these online exercises. Based on the following records (see Fig. 4), it is clear that the national contest attracted many young users due to the incentives. For example, we found more than four million access records for the listening contest items (elementary school students) and three million access records for the listening contest items (junior high school students).

Based on the records shown above, it is clear that the majority of teachers and students mostly focused on the sections related to vocabulary, listening, and reading. Much less attention was given to the speaking and writing sections. It seems that nationwide contests on speaking and writing skills should also be developed as they may help to draw students' attention to these two skills.

Fig. 4 The number of students' access to various contests

The Challenges and Difficulties in Accessing and Using Cool English

As shown above, more and more users are accessing the materials and tools from the Cool English site. We have provided two channels for user support. One is via the telephone, and the other is via Facebook messages. During the past 6 months, from February to July 2020, we received a few phone calls and messages complaining that the access to videos could be slow sometimes. Some teachers also sent in complaints that Cool English should make the content available via smartphones, as they do not have enough PCs, notebooks, and tablets. County officials in central Taiwan even made contact regarding licensing the videos on the Cool English website. They plan on delivering the videos via their own local cable TV station.

In addition to these messages, several issues were reported in various newspapers and TV programs during the several months.

1. There were limited bandwidth and unstable connections at some schools.
2. Limited eLearning devices (computers and tablet PCs) available.
3. Lack of teacher and parent training.
4. Parents were not familiar with online learning resources.
5. Home access to the Internet was not available in some remote areas.
6. Teachers and parents had a limited understanding of the content and service in each of the different learning platforms.

Among these various issues, the most critical ones were thought to be the limited bandwidth and the lack of learning devices such as notebooks and tablets.

Conclusions and Implications

COVID-19 has been a terrible disaster for the whole world, with more than 23 million people testing positive and close to 800,000 resulting deaths due to the highly contagious disease at the time of writing. For education, it has created an immense challenge never experienced before. Many traditional ways of education were in need of change, and this disaster further pushed for the implementation of online learning, including synchronous and asynchronous learning. Before the COVID-19 pandemic, online teaching and learning were often considered to be supplementary to classroom teaching. However, due to the pandemic, online teaching and learning have become essential for many educators and students around the world.

Although UNESCO has indicated that we should take action to “make free and open source technologies available to teachers and students” [16, p.6], the poor quality of OERs has been constantly criticized [17]. To provide high-quality OERs is an area which governments and educators need to continue to work on. Each country should have different plans and strategies to provide better OERs for students and teachers with the help of collaborative efforts of many people. These should include at the very least governments, non-profit organizations, teachers, content designers, and programmers.

In Taiwan, although the impact of the coronavirus has been much lower than that on many other countries, the rapid growth of the online teaching and learning has

reminded the government and educators that better resources for conducting web-based synchronous and asynchronous teaching and learning should be prepared in advance. During February to July 2020, the Cool English site was able to provide services to many students and teachers because the Ministry of Education had invested in content research and development for several years. Thus, its content and tools could be easily used to support language teaching and learning in many schools. Again, it should be noted that good OERs would need much time and human resources to develop. The Cool English site was developed with the generous help of many experts in TESOL, computer sciences, and digital learning technologies.

Although the Cool English site has been used by many students and teachers, it is clear that some useful tools and technologies are still being underused by our users. Most teachers and students only focus on the reading, listening, vocabulary, and grammar sections. In fact, there are some other useful resources such as learning activities based on automatic speech recognition technologies and various types of games for language learning. Because most users are less familiar with these tools for language learning, our team needs to continue to promote these new learning tools. Moreover, language teachers can also take advantage of the powerful learner tracking tools to help easily monitor student progress when using this website.

The development of higher quality OERs is just one of the many key issues we need to deal with for online education. The requests and news reports received during the COVID-19 period illustrate that Taiwan and the whole world have much work to do to improve its online teaching and learning. Students do not have enough PCs, notebooks, or tablets in schools. The bandwidth in many schools is not strong enough to support large traffic when many users connect at the same time. Some students in remote locations do not have PCs, notebooks, or tablets at home. Moreover, some school teachers are not familiar with the tools and resources for online learning. It is thus suggested that training should be provided to these teachers.

The challenges brought by the pandemic have pushed people around the world to pay more attention to online education. Although there are many quality commercial web courses available, there is still a desperate demand globally for “high-quality” OERs. The Cool English project has not only developed innovative materials with government support but also adopted very useful OER materials from around the world. We believe that this “blended” approach can help educators speed up the development of various OERs that can better serve students and teachers in the post-COVID-19 period.

Compliance with Ethical Standards

Conflict of Interest The author declares that there is no conflict of interest.

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