

Chinese Faculty Members' Open Educational Resources (OER) Usage Status and the Barriers to OER Development and Usage

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Abstract—The purpose of this study was to investigate faculty members' usage of Open Educational Resources (OER) as well as the barriers to OER development and usage. 360 faculty members from Zhejiang University (ZJU) in China were randomly selected to complete a survey. The study found that: (1) most of surveyed faculty members rarely utilized OER, while they had some awareness of sharing educational resources; (2) the majority noticed online educational materials published for learning or reference, while they ignored open source software or licensing tools for sharing and reusing resources; (3) lack of time and skills were significant obstacles for faculty members to develop OER, while lack of incentives was a potential obstacle; (4) content, experience, and school factors affected faculty members' OER usage; (5) online teaching experiences impacted incentive to develop OER as well as how to develop OER. It also played a key role in faculty members' perceptions about the experience and habit factors as possible barriers to OER usage. Results of the study implicate that more serious efforts are needed to improve the awareness and development of OER in China.

Index Terms—Open Educational Resources (OER), perceptions, usage, barriers

I. INTRODUCTION

In 2001, the famous Open Courseware (OCW) project was launched by Massachusetts Institute of Technology (MIT), opening the worldwide Open Educational Resources (OER) movement. In the following year, the William and Flora Hewlett Foundation funded an initiative that UNESCO held a forum on the Impact of Open Courseware for Higher Education Institutions in Developing Countries [1]. During the forum, the term "Open Educational Resources" (OER) was coined and first defined as "the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for noncommercial purposes" [2].

With the development of the OER movement, more efforts have been made to define and describe the concept. In a report of the Organization for Economic Co-operation and Development (OECD), OER was suggested to refer to "accumulated digital assets which can be adjusted and provide benefits without restricting the possibilities for others to enjoy them," including learning content, tools, and implementation resources. Specifically, learning content includes "full courses, courseware, content modules, learning objects, collections and journals." Tools include

"software to support the development, use, reuse, and delivery of learning content, including searching and organization of content, content and learning management systems, content development tools, and online learning communities." Implementation resources include "intellectual property licenses to promote open publishing of materials, design principles of best practice and localize content"[3]. As the primary champion in the OER movement, the William and Flora Hewlett Foundation defined OER as "teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others," including full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge [4].

In the book *A Basic Guide to Open Educational Resources (OER)*, published by Commonwealth of Learning and UNESCO, OER was described as "any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by educators and students, without an accompanying need to pay royalties or license fees." [5]. Thus, the definitions of OER have moved from an initial description of the materials to ones involving the tools needed to support OER, and eventually to include ideas related to the associated legal and economic issues. With the development of practice, however, definitions of OER will become more definitive, understandable, and widely recognized.

Besides the accelerating discussion related to the concept of OER, a series of OER-related initiatives, papers, books and reports emerged during the past decade. In fact, OER-related initiatives were increasingly launched around the world, such as the Multimedia Educational Resources for Learning and Teaching Online (MERLOT) of California State University, Open CourseWare consortium, Connexions from Rice University, Apples' iTunes U; Japanese OCW Consortium; Paris-Tech OCW project in France; JORUM and OpenLearn in UK; and OER Africa and Teacher Education in Sub-Saharan Africa (TESSA). Additional initiatives were introduced in detail in *OER Dossier: Open Educational Resources and Higher Education* [6]. It is also noteworthy that the birth of Cape Town Open Education Declaration in September 2007. It aimed to accelerate efforts to pro-

mote open resources, technology, and teaching practices in education [7].

Based on two years' intensive interaction with members in the OER international community, in 2008, UNESCO presented the priority issues for promoting the OER movement and priority issues for different stakeholders in a report namely *Open Educational Resources: The way forward* [8]. A few years later, UNESCO and the Commonwealth of Learning (CoL) produced a series of publications related to OER, such as *Guidelines for OER in Higher Education* [9]. Some of these CoL reports were about OER practices, such as *OER and Change in Higher Education: Reflections from Practice* [10] and *Open Educational Resources: Innovation, Research and Practice* [11]. Some were about the various challenges in promoting OER movement, including various policies, economic, technical, and other issues. Related reports included the *Survey on Governments' OER Policies* [12], *Exploring the Business Case for Open Educational Resources* [13] and *The Re-use and Adaptation of Open Educational Resources (OER): An Exploration of Technologies Available* [14].

Among the more recent documents related to OER is the *Report on the Assessment and Accreditation of Learners using Open Education Resources (OER)* [15]. From the above official reports and works, it is easy to conclude that the recent studies on OER mainly provide a comprehensive look at a key issue such as the connotation or definition of OER, major initiatives OER worldwide, the practices related to the integration of OER in higher education, and the barriers and challenges in promoting the OER movement.

As to the status of OER usage, OECD made an investigation into the drivers and barriers for institutions, individual teachers, and researchers sharing OER in some OECD member countries. Babson Survey Research Group and Quahog Research Group made an investigation on OER in US higher education [15]. However, the official reports on the status of OER usage in developing countries are few, especially from the user perspective. The original intention of this study, therefore, is attempting to map the status of OER usage in China through investigating Chinese faculty member OER usage status and the potential barriers to them developing and using OER.

Following closely with the footsteps of developed countries, China actively engaged in the OER movement and put forward several national-level projects, such as the Chinese Quality Course (CQC) Project, National Cultural Information Resources Sharing Project, and the Science Data Sharing Project. Among these projects, the CQC project, which was initiated by the Ministry of Education of the People's Republic of China in 2003, was one of the most influential projects in terms of reform and development of Chinese higher education. According to the Chinese Quality Courses Resources Center (CQCRC), CQC means Chinese excellent courses with the first-class teaching level and distinctive characteristics [16]. The CQC project aims at promoting OER to improve the quality of the undergraduate education in the Chinese higher education system.

To encourage more universities and faculty members to join in the construction of CQC project, a "National-Provincial-School" three-level system of quality courses was developed. Each province correspondingly put for-

ward "Provincial Quality Course" (PQC) Projects and every university or college also correspondingly put forward "School Quality Course" (SQC) Projects. At the same time, a unified portal for all CQCs named the National CQC online (<http://jingpinke.com>) was set up by the Higher Education Press in 2007. By 2011, there were 20,076 quality courses (3,623 CQCs, 7,814 PQCs and 8,169 SQCs) available on the National CQC online.

After the CQC project, the Ministry of Education launched a new style of OER project named "Video Open Course" (VOC) Project in 2011. The project aims to improve college students' and the public's science culture quality through putting the lecture videos of professors from well-known Chinese universities online. The first group of VOCs was shared starting in November 2011 on the Chinese higher education curriculum resource sharing platform named iCourse (<http://www.icourses.cn/>). As of August 2014, there were 603 VOCs in 12 disciplines available on iCourse. To further improve the opening of higher education and the sharing of quality educational resources, the Ministry of Education again put forward the "Resources-Sharing Courses" (RSC) project. Different from VOC, the RSC project mainly includes public basic courses, professional foundation courses, and professional core courses of Chinese universities or colleges. The RSCs do not just contain entire teaching episode videos; instead, they also include fundamental resources required for teaching and learning activities, such as course introductions, syllabi, course materials, Q&A sheets, reference lists, etc. The first group of RSCs shared on iCourse in June 2013 included 120 courses (84 undergraduate courses, 22 vocational courses, and 14 online education courses) from 10 disciplines. And the total number of shared resources at that time reached nearly 32,000 [17].

Since 2012, with the growing popularity of MOOCs in the field of higher education across the globe, the Chinese Ministry of Education and Chinese universities also actively put forward Chinese MOOCs projects. For instance, in 2013, Tsinghua University developed the local MOOC platform called "xuetang online" (<http://www.xuetangx.com/>) on the basis of open source platform "Open edX." In the same year, Shanghai Jiaotong University also developed another local MOOC platform CNMOOC (<http://www.cnmooc.org/>). In May 2014, the first group of 13 Chinese MOOCs opened freely to the public on iCourse. Besides the national OER projects mentioned above, there were several other important projects in China. The report "Open Educational Resources in the People's Republic of China: Achievements, Challenges and Prospects for Development" introduced various Chinese OER projects in detail [18].

An in-depth literature review found that the discussion of OER in China mainly focused on four areas: (1) the connotation of OER; (2) the introduction and review of the successful OER projects in other countries; (3) the analysis of the construction, mechanisms for sharing, and implementation or operation of OER; and (4) the analysis of the problems and issues related to OER development and sustainability. As to the OER development and usage, most studies focused on the CQC Project itself rather than Chinese OER practice and development from the perspective of OER in a global context. However, there are scant studies of the status of developing and using of OER in China, especially from the users' perspective.

II. PURPOSE AND OBJECTIVES

In order to cast light on the diffusion of OER in China, the present study was initiated to inquire into faculty members' OER usage status and their perceptions about barriers to their OER development and usage. This study was conducted at Zhejiang University (ZJU) in China during the 2013-2014 academic years.

In describing faculty members' OER usage status, OECD's definition of OER was used as a reference. According to the definition, OER should include learning content, tools, and implementation resources.

As to the barriers to OER development and usage, some official investigations have been made in the developed countries. For instance, the OECD report, mentioned earlier, noted that a lack of time and skill and the absence of a reward system are the most significant barriers to developing and using OER. In addition, according to a more recent Babson Survey Research Group's investigation, the time and effort to find and evaluate OER are consistently listed as the most important potential barriers to faculty members' adoption of OER. Fortunately, some scholars have sought to identify the factors that hinder OER adoption and re-use in the developing countries [19] [20] [21] [22]. Hatakka, in particular, has argued that it is essential to explore the organic link between OER adoption or re-use and the institutional structures of educational systems in the developing world and their dominant pedagogical norms and values. From this perspective, cultural norms and traditions in terms of teaching and learning play a huge role in how free and open resources are developed, shared, and utilized. In addition to such cultural issues, not too surprisingly, the perceived quality of OER is also a key inhibiting factor for OER adoption or re-use [23].

But are these factors found in previous studies also the barriers to OER usage in China? What do key stakeholders such as faculty members believe? Are there other potential inhibiting factors in the OER usage in China from a faculty members' perspective? Based on above literature, the specific objectives of the present study include: (1) Describing faculty members' OER usage status; (2) Describing the barriers to faculty members' OER development and usage; and (3) Examining the impact of faculty members' online teaching experience on their perceptions about barriers to faculty members' OER development and usage.

III. METHODS

A. Sample

The target population of this study was faculty members at the ZJU (N=3,350). Founded in 1897, ZJU is a comprehensive and research-oriented university in China. ZJU is constituted by seven distinct faculties (Faculty of Humanities, Faculty of Social Sciences, Faculty of Science, Faculty of Engineering, Faculty of Information Technology, Faculty of Medicine, and Faculty of Agriculture, Life and Environment) and some independent institutes (such as China Academy of West Region Development). Since 2003, ZJU have actively participated in Chinese higher education's OER development projects, including the CQC, PQC, and VOC Projects. Importantly, 64 CQCs and 124 PQCs were produced by ZJU between 2003 and 2010. All of these CQCs and PQCs are available on the National CQC online and the ZJU website. Of these resources, eight VOCs produced by ZJU were selected as

the first group of 103 Chinese VOCs in 2011. In addition, 21 RSCs produced by ZJU were selected as the first group of 120 Chinese RSCs in 2013. Six MOOCs produced by ZJU will be open to the public between September and November in 2014. All these VOCs, RSCs, and MOOCs are available on www.iCourse.com. ZJU has played a leading role in the construction of Chinese OER and it provided a robust environment for its faculty members to develop and use OER.

B. Instrumentation

Based on an extensive review of the literature on OER, a three-part questionnaire was developed as the research instrument to measure faculty members' OER usage as well as the barriers to developing and using OER. The first part of the questionnaire aimed at gathering data about participants' personal characteristics (faculty, gender, age, academic title, and teaching experience) and their online teaching experience.

The second part of the instrument was designed to measure participants' OER usage status. OECD's definition of OER was used as a guide for creating contents of this part. Faculty members' OER usage was measured in the following three dimensions: (1) materials published for learning or reference; (2) open source software for the development and delivery of resources; and (3) licensing tools for sharing and reusing resources. The materials include open courses resources, such as MIT OCW, CQC, VOC, and MOOCs; open learning objects, such as Connexions; open references, such as Wikipedia, the Baidu library, Docin, Youku, and Tudou. Open source software includes Moodle, Sakai, eduCommon, Wiki, etc. The licensing tool here refers to Creative Commons (CC) licenses.

Participants were asked to indicate their familiarity with OER by responding to a series of items on a five-point scale. The points on the scale were: 1=haven't heard; 2=Heard but haven't used; 3=Rarely used; 4=Occasional used; and 5=Frequently used.

Possible barriers to faculty members' OER development and usage were measured in the third part. Based on the literature review, four statements were designed to indicate the possible barriers to faculty members' OER development, while sixteen statements were designed to indicate possible barriers to faculty members' OER usage. Participants were asked to indicate their perceptions about the barriers to developing and using OER by responding to a series of statements on a five-point Likert scale from strongly disagree to strongly agree. Because an interval scale was used, the final score for each possible barrier category was computed with an unweighted factor score in the subsequent analysis.

The survey instrument was reviewed and revised several times by three educational technology experts and a group of graduate students majoring in educational technology.

C. Data Collection and Analysis

Data were collected from September 2013 to June 2014. In total, 380 faculty members were randomly selected from the 3,350 faculty members representing the seven Faculties of ZJU. All participants were provided with written information introducing the nature and purpose of the research project. At the same time, these participants were also told that they could choose not to fill in

part or all of the survey and that the survey was anonymous. Finally, 360 useful surveys were returned and the response rate was about 95%.

Data were compiled and analyzed using the SPSS19.0. Descriptive statistics were used to describe each variable. An exploratory factor analysis (EFA) was performed on the sixteen items related to OER usage barriers. Factors with eigenvalues greater than 1 were retained. Items with initial loading below .5 and items that were cross-loaded were removed.

IV. FINDINGS

360 participating faculty members were from the seven Faculties of ZJU and some independent institutes. 230 (64.1%) of the participants were male and 129 (35.9%) were female. In terms of age, 54 (15%) were between 25 and 30 years old, 166 (46.1%) were between 31 and 35 years old, 82 (22.8%) were between 36 and 40 years old, and 45(12.5%) were over 41 years old. Among the participating faculty members, 49 (13.8%) were professors, 164 (46.3%) were associate professors, and 141 (39.8%) were assistant professors. Regarding teaching experience, 91 (25.3%) had 1 year or less teaching experience, 61 (16.9%) had 2 or 3 years' teaching experience, 62 (17%) had 4-9 years' teaching experience, and 42 (11.7%) had 10 years or more than 10 years' teaching experience. As to online teaching experience, 53 (14.7%) had online teaching experience, while the remaining respondents (84.2%) lacked it.

As to Objective 1 (describing faculty members' OER usage status), data analysis found that participating faculty members rarely used the resources of CQC and VOC. They occasionally used the reference materials like Wikipedia, Baidu library, Docin, Youku, and Tudou. Interestingly, 144 (40%) had not heard of MOOC providers such as Udacity, Coursera, and edX. Similarly, 133 (37.46%) never heard of OER that were highly popular abroad such as MIT OCW and Connexions. As to the open source software, more than one-third (35.21 %) of the participants did not know the term, while slightly more (42.54%) had used such software. As to the licensing tools, more than half (52.82%) of the participants had not heard of CC licenses, while only 20.9% had actually used CC licenses. Table 1 offers more specific details on faculty members' OER usage status.

As to Objective 2 (describing the barriers to faculty members' OER development and usage), participating faculty members indicated strong agreement with statement "I have no time to develop OER" (M=3.78), followed by "I don't know how to develop OER" (M=3.76), "I have no incentive to develop OER" (M=3.2), and "I don't know the value of developing OER" (M=2.61). Table II shows the detailed results.

To better understand the types of barriers impeding the use of OER, an exploratory factor analysis (EFA) was conducted (Table III). Results suggested the possible barriers could be grouped into five factors: (1) content factor, (2) experience factor, (3) school factor, (4) interface factor, and (5) habit factor. All sixteen items were acceptable with initial loading higher than .5.

Table IV indicates the basic descriptive and reliability of the five factors. Internal reliabilities were tested and the Cronbach's Alpha coefficients of the five factors were between 0.70 and 0.88: content factors (0.76); experience factors (0.75); school factors (0.88); interface factors (0.70), and habit factors (0.81). The five factors identified

TABLE I. PARTICIPATING FACULTY MEMBERS' OER USAGE STATUS (N=360)

OER usage status	N	M	SD	NH	HNU	RU	OU	FU
Wikipedia	357	4.34	0.91	4	18	31	105	199
Baidu library / Docin	357	4.29	0.81	3	9	34	147	164
Youku / Tudou	358	4.22	0.90	3	17	45	126	167
CQCs / PQCs / SQCs	357	3.22	1.06	19	77	103	123	35
VOCs (such as NetEase VOCs, VOCs on iCourse)	357	3.3	1.12	24	69	85	135	44
MOOCs (such as Coursera, Udacity, edX)	353	2.19	1.25	144	89	46	58	16
Foreign OER projects (such as MIT OCW, Open Source Software)	355	2.21	1.20	133	94	61	54	13
(such as Moodle, Sakai, eduCommon)	355	2.48	1.42	125	79	48	61	42
Creative Commons	354	1.81	1.06	187	93	40	24	10

Note: 1=Haven't heard (NH); 2= Heard but haven't used (HNU); 3=Rarely used (RU); 4= Occasional used (OU); 5=Frequently used (FU).

TABLE II. PARTICIPATING FACULTY MEMBERS' PERCEPTIONS ABOUT THE POSSIBLE BARRIERS TO THEIR OER DEVELOPMENT (N=360)

Possible barriers	N	M	SD	D	N	A	SA
I have no time to develop OER.	356	3.78	3	17	82	209	45
I don't know how to develop OER.	357	3.76	2	24	85	191	55
I don't know the value of developing OER.	353	2.61	18	158	126	45	6
I have no incentive to develop OER.	354	3.2	8	56	159	119	12

Note: 1=Strongly Disagree (SD), 2=Disagree (D), 3=Neutral (N), 4=Agree (A), 5=Strongly Agree (SA)

TABLE III. RESULTS OF THE EXPLORATORY FACTOR ANALYSIS

Statements	Fac-tors	Fac-tor1	Fac-tor2	Fac-tor3	Fac-tor4	Fac-tor5
The contents I'm interested in are not much in OER repository.	C1	0.74				
The quality of the contents in OER repository is not high.	C2	0.72				
The contents in OER repository don't cover all the disciplines.	C3	0.70				
The update of OER repository is not in time.	C4	0.69				
There are not friendly interactive interface in OER repository.	C5	0.54				
No colleagues and friends introduced OER to me.	E1		0.80			
No colleagues and friends encourage me to use OER.	E2		0.77			
I'm not familiar with OER around.	E3		0.65			
I don't have much time to use OER.	E4		0.63			
There are not any OER-related links on the school website.	S1			0.87		
There are not any reports and propaganda on the school website.	S2			0.86		
It is too slow to download OER, wasting too much time.	I1				0.77	
It is very difficult to access to OER website.	I2				0.75	
It is laborious to search for OER.	I3				0.69	
I don't like online teaching.	H1					0.91
I'm not accustomed to online teaching.	H2					0.88

Note: C=Content, E=Experience, S=School, I=Interface, H=Habit; Extraction Method: Principal Components Analysis; Rotation Method: Varimax Rotation; a. Iterations for Convergence at 7 times

met the factor analysis criteria and demonstrated that the items appeared to group together well. As to faculty members' perceived barriers to OER usage, the study found that the most concerned was experience factors (M=3.29; SD=0.67) and school factors (M=3.29; SD=0.77), followed by content factors (M=3.14; SD=0.53), interface factors (M=3.11; SD=0.63) and habit factors is (M=2.77; SD=0.79).

As to Objective 4 (examining the impact of faculty members' online teaching experience on their perceptions about barriers to faculty members' OER development and usage), Table V reveals that online teaching experiences had a significantly impact on faculty members' perceptions about the following statements as possible barriers to OER development (p< .05): (1) I don't know how to develop OER, t (351) = 4.94; (2) I don't know the value of developing OER, t (347) = 2.08; and (3) I have no incentive to develop OER, t (349) = 2.67. Generally speaking, faculty members who had online teaching experience tended to agree less with these three statements than did faculty members who had no online teaching experience.

As Table VI shows, online teaching experiences had an extremely significant impact on faculty member perceptions about experience and habit factors (p< .05): (1) experience factors, t (348) = 2.17; and (2) habit factors, t (347) = 3.27. Chinese faculty members who had online teaching experiences tended to agree less with the stated experience factors and habit factors as possible barriers to their OER usage.

V. DISCUSSION

The study found that the majority of participating faculty members from one university in China used OERs that are globally popular such as Wikipedia, as well as resources more specific to China including Baidu library, Docin, Youku, and Tudou. However, they rarely used resources of CQC and VOC. About 40% of these Chinese faculty members were unfamiliar with OER and MOOCs projects that are quite popular in the West (e.g., MIT OCW, Connexions, etc.). While open source software was used by more than four in ten of the study participants, another third of the participants did not even know what it was. Clearly, more education about OER, open source software, and emerging educational delivery vehicles for open education like MOOCs is needed in China. Given that over half of the participants had never heard of a CC type of license and even more had never used one, better understanding of the licensing practices and tools for OER is among the areas in which the Chinese government might focus.

In a nutshell, this study found that ZJU faculty' understanding and usage of OER is not satisfactory. Such findings concurred with previous study results that OER adoption and utilization by developing countries are at a very low level [24]. The study also discovered that the majority of ZJU faculty members have paid more attention to those online free materials published for learning or reference than those open source software that might help them develop and deliver instructional resources, especially the variety of licensing tools for sharing and reusing open online resources.

Another finding explored in this study is related to the barriers to faculty members' OER development. Interesting to note, most of the faculty members participating in

TABLE IV.
DESCRIPTIVE STATISTICS AND RELIABILITY ABOUT FACTORS (N=360)

Factors	N	M	SD	Alpha
Content factors	354	3.14	0.53	0.76
Experience factors	356	3.29	0.67	0.75
School factors	355	3.29	0.77	0.88
Interface factors	355	3.11	0.63	0.70
Habit factors	353	2.77	0.79	0.81

Note: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

TABLE V.
DISTRIBUTION OF PERCEPTIONS ABOUT BARRIERS TO FACULTY MEMBERS' OER DEVELOPMENT BY ONLINE TEACHING EXPERIENCES (N=360)

Barriers to OER development	Online teaching experiences	N	M	SD	DF	T	P
I have no time to develop OER.	Have	53	3.70	0.82	350	0.81	0.42
	Have no	299	3.79	0.75			
I don't know how to develop OER.	Have	53	3.28	0.93	351	4.94**	0.00
	Have no	300	3.86	0.75			
I don't know the value of developing OER.	Have	53	2.40	0.74	347	2.08*	0.04
	Have no	296	2.66	0.85			
I have no incentive to develop OER.	Have	53	2.92	0.73	349	2.67**	0.008
	Have no	298	3.25	0.84			

Note: 1=Strongly Disagree (SD), 2=Disagree (D), 3=Neutral (N), 4=Agree (A), 5=Strongly Agree (SA); *Correlation is significant at p < .05; ** Correlation is significant at p < .01.

TABLE VI.
DISTRIBUTION OF PERCEPTIONS ABOUT BARRIERS TO FACULTY MEMBERS' OER USAGE BY ONLINE TEACHING EXPERIENCES (N=360)

Barriers to OER usage	Online teaching experiences	N	M	SD	DF	T	P
Content Factors	Have	53	3.19	0.52	348	0.54	0.59
	Have no	297	3.15	0.52			
Experience Factors	Have	53	3.12	0.57	350	2.17*	0.03
	Have no	299	3.34	0.68			
School Factors	Have	53	3.25	0.84	349	0.57	0.57
	Have no	298	3.31	0.75			
Interface Factors	Have	53	3.11	0.58	349	0.08	0.094
	Have no	298	3.12	0.63			
Habit Factors	Have	52	2.45	0.71	347	3.27**	0.01
	Have no	297	2.84	0.79			

Note: 1=Strongly Disagree (SD), 2=Disagree (D), 3=Neutral (N), 4=Agree (A), 5=Strongly Agree (SA); *Correlation is significant at p < .05; ** Correlation is significant at p < .01.

this study indicated that they lacked sufficient time to develop OER. To make matters worse, even if they did have time, most of them did not know how to develop OER. Such findings are consistent with other surveys from Western countries [25]. These previous studies also found that, in participants' viewpoints, time and skills were significant obstacles to the development of OER. In

response to the statement "I have no incentive to develop OER" (which was a possible barrier to develop OER), more than one-third of the respondents agreed or strongly agreed that they lacked incentives. In addition, more than four in ten were neutral in regards to this question. Such a response indicates that the lack of incentives remains an important obstacle hindering the development of OER. Worse still, in response to the statement "I don't know the value of developing OER," about half indicated that they disagreed or strongly disagreed with the statement, while one-third were neutral. Such a result indicates that most of the participants have realized the value of developing OER. The above findings are consistent with the previous study that the Chinese faculty members have realized the value of developing OER and the significant barrier to them developing OER was the lack of incentive.

After conducting a factor analysis on the data collected, possible barriers affecting faculty members' OER usage were classified into five dimensions: (1) content factor, (2) experience factor, (3) school factor, (4) interface factor, and (5) habit factor. The study found that, among these five categories, experience factor and school factor received the most concern; followed by content factor and interface factor. Habit factor was the least problematic, perhaps indicating that most of the participants did not believe that online teaching was a significant barrier. The participants' attitude toward school factor signaled that there was a certain link between faculty members' OER usage and the institutions' OER policies and practices. The findings confirmed Hatakka's opinion regarding the need to explore the organic link between OER adoption and the institutional structures of educational systems in the developing world.

As might be expected, familiarity with online instruction positively impacts attitudes toward OER. In fact, online teaching experiences had a significant impact on faculty members' perceptions towards the barriers to OER development such as the incentive to develop OER, ways to develop OER, and the value of developing OER. It also played a role in faculty members' perceptions about experience factors and habit factors as possible barriers to their OER usage. Such findings indicate that opportunities to engage faculty members in OER-related practice, such as online teaching, are vitally needed to encourage them to develop and use OER.

VI. CONCLUSIONS AND RECOMMENDATIONS

As to the measurement tools employed in the study, there were internal limitations to point out. For example, other factors such as personality traits, cognitive styles, and motivation might provide additional insights into the benefits of the flipped classroom and participant changes over time. As to the e-learning satisfaction survey instrument, although it was tested in other studies, it was prepared for a typical e-learning course and it did not take into account the characteristics of a flipped classroom. Therefore, an instrument specifically considering flipped classroom practice might be needed to reflect more authentically and effectively students' actual perceptions about their experiences.

With the emergence of large numbers of Open Educational Resources (OER) initiatives around the world during the past two decades, OER-related papers, books, and reports have increasingly appeared in academia. However, most of the research has focused mainly on some compre-

hensive issues at the macro level. Few studies have focused on the status of OER usage, especially in developing countries, and even less from the faculty members' perspectives. The current study was intended to respond to this gap in the knowledge base about the usage as well as the barriers to use in regards to OER at one university in China.

Clearly, in order to promote the diffusion of OER worldwide, there is a great need to better understand faculty members' OER usage status and their perceptions about possible barriers to OER usage in the developing world. In this study, we attempted to explore the Chinese faculty members' OER usage, their perceptions about the barriers to their OER development and usage. Findings of the study provided important evidence for understanding the current status of OER development and usage in developing countries like China. Nevertheless, generalizations are constrained by several limitations including the time of this survey and the fact that the participants came from a relatively small group of Chinese faculty members of one comprehensive university. The reader should be aware that there are thousands of universities in China. The differences regarding technology availability and use among these universities are dramatic. Consequently, further research should be carried out in a larger population or among some specific groups, such as researchers, instructional designers, technology directors and other university administrators, and faculty members of different disciplines. Additional research might also target the types of universities (e.g., normal universities, research-oriented universities, etc.). And it might focus on people or organizations who are leaders in OER development and usage.

In regards to the measurement tools used in the study, although there is a theoretical basis for every section of the survey, there remain several obvious weaknesses. For example, in the second part, we have just listed some typical contents, tools, and license terms and did not allow the participants to list additional information about OER. As a result, the information gained in this study about the faculty members' OER usage remains lacking in several areas (e.g., cross-cultural sharing, alternative forms of assessment, copyright, plagiarism, etc.). In the third section of the survey on the barriers to OER development and usage, many items are referenced from a previous study and, hence, may be missing items of significance. To overcome the above weaknesses, more detailed questions need to be designed to measure faculty members' OER usage and the potential barriers in developing and using OER perhaps through interviews, focus groups, or direct observations.

Despite the above limitations and weaknesses, the study found some exciting findings. First of all, most of the faculty members have the awareness of sharing educational resources. Such a finding would likely have been highly unlikely prior to the age of Web-based instruction of the past decade or two. Second, faculty members are starting to utilize OER in their online teaching. In fact, they found several important advantages, including the compatibility of OER with their own instructional approaches. At the same time, the study found some key challenges that cannot be ignored. For example, these Chinese faculty members were only aware of the contents of OER, while not aware of the related tools and licensing terms, such as CC license. The study also found that time, skills and incentives were significant obstacles toward the development of

OER. Experience factors and school factors were the highest perceived barriers to faculty members' OER usage. It is noteworthy that faculty members' online teaching experiences would significantly impact teachers' perception about attributes of OER and their attitude toward the barriers to developing and using OER.

In summary, faculty members' awareness of OER needs to be improved, especially their awareness about OER related tools and licenses terms. More opportunities need to be provided to faculty members for them to participate more fully in OER-related practices. For instance, they might employ OER in online and blended forms of teaching as a means to increase the perceived attributes of OER as well as encourage them to develop and use OER.

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