

# College Students' Open Educational Resources (OER) Experience and Their Perceived Attributes: A Study from Zhejiang University

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**Abstract**—The purpose of this study was to investigate Chinese college students' experience of and their perceived attributes of Open Educational Resources (OER). Students from Zhejiang University were selected as target population. A two-part questionnaire was developed and randomly sampling was used to collect data. The results of data analysis found that: three fourth of participating students had OER usage experience; students tended to have strong agreement with perceived relative advantage and compatibility of OER, while students' perceived trialability, complexity and observability of OER are not satisfactory; gender has no significant influence on college students' perceptions about all of the five attributes of OER, while having OER usage experience or not would significantly impact on students' perception about attributes of OER. Based on the findings, the study concluded by putting forward some suggestions..

**Index Terms**—Open Educational Resources (OER); innovation; attributes; college students

## I. INTRODUCTION

The first decade of the 21st century has been called as the o-decade (open source, open systems, open standards, open archives, open everything) just as the 1990s were called the e-decade[1]. The emergence of open educational resources (OER) practice could be viewed as one of the most outstanding educational innovations came out in the new millennium. As we all know, in 2001, MIT launched its Open Courseware (OCW) Project, which could be looked as the starting point of open education movement around the world. Spurred by MIT's OCW project, more and more countries proposed its own OCW projects and the past decade witnessed rapid development of OCW in both developed countries and developing countries[2][3][4][5].

Due to its openness, OER has some outstanding attributes that attract individual and institutions to use it [6]. For example, there is an obvious and/or potential financial saving due to eliminating the duplication of efforts in the development of instructional materials [7][8]; According to OECD's study[9], there are four kinds of drivers that drive individuals and institutions to adopt OER: technological, economic, legal and social drivers. The technological and economic drivers include improved, less costly and more user-friendly information technology infrastructure (such as broadband), hardware and software. Content is cheaper and easier to produce and costs can be further

reduced by sharing. New economic models are emerging around the distribution of free content. Legal drivers are new licensing schemes that facilitate free sharing and reuse of content. Social drivers include increased willingness to share.

Recent literature review found that, although there are increasing studies focusing on OER-related issues, they are mainly conducted by western researchers and most of them focused on OER production or OER-related policies analysis[10][11], whilst there is still very limited literature exploring OER use and reuse status, especially from the perspectives of college students living in developing countries. The original contribution of this study to the field is to investigate Chinese college students' experience of and their perceived attributes of OER.

Since the beginning of the 21st century, China has huge impetus to adopt OER to propel the public's educational level. The term "OER" was soon introduced to China and popularized among scholars and educators after it was firstly proposed in 2002. To propel OER movement in China, Chinese government put forward three influential national projects: the Chinese Quality Course Project, National Cultural Information Resources sharing Project, and the Science Data Sharing Project. Among the three projects, Chinese Quality Courses Project is the most influential project impacting higher education's reform and development. As a Chinese version of OCW project, the "Chinese Quality Course" (CQC) project was initiated, supported and funded by the Ministry of Education in 2003 and its main purpose was to using OER to improve the quality of the undergraduate education in Chinese higher education system. Specifically, the project aims to accelerate teaching content reform and educational modernization in Chinese higher education system. By the end of December 2010, 3862 courses produced by 746 colleges and universities were accepted as Chinese Quality Courses. Chinese universities pay special attention to the CQC Project because selected courses represent a national recognition as well as a national award. To encourage faculty members to apply for CQC, each province correspondingly put forward "Provincial Quality Course" (PQC) Project and every university/college put forward "School Quality Course" (SQC) Projects. Therefore, a "National-Provincial-School" three-level system of quality courses was developed in China[12]. In 2007, a unified portal for all CQC named the National CQC online (<http://jingpinke.com>) was set up by the Higher Education Press. According to the Brief report of Chinese National

Quality Courses Online[13], the total number of OCW available on the National CQC online has reached 2446 in May, 2011, which include 20284 domestic courses (3835 CQCs, 8279 POCs, and 8170 SQCs) and 4162 OCW page links to foreign universities and colleges. At the same time, 44832 textbooks were available on the platform.

Besides the National CQC online, there are some other organizations and commercial websites joining in propelling Chinese OER movement. Among them, the influential OER-related organizations and/or websites include the National Science Library of China (NSLC), Center for Contemporary Cultural Studies, the community of Songshuhui (literally "Science Squirrel Club"), Social Learn Lab Community, and etc. In 2011, to follow the world top-ranked universities' practice of putting professors lecture video online, the Ministry of Education put forward a new style of OER project named "Video Open Course" (VOC) Project. Totally, the Ministry selected 103 VOCs in 2011 and the number will be expected to be 500 in 2015. All of these VOCs will be available on both institutional or university's website and commercial websites.

Literature review found that Chinese research of OER is mainly focused on understanding the concept of OER, the construction and the operating mode of OER, as well as the OER sharing mechanism. Similar with international literature, few Chinese OER-related studies explored current or potential OER users' OER experience and their perceived attributes.

The purpose of this study was to describe college students' OER experience and perceptions about OER at the Zhejiang University during the 2012-2013 academic year. In describing students' perceived attributes of OER, Rogers' attributes of innovation (relative advantage, compatibility, complexity, trialability, and observability) were used as the theoretical base[14]. According to Rogers' attributes of innovation theory, Relative advantage is "the degree to which an innovation is perceived as being better than the idea it supersedes"(p. 229). Compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters"(p. 240). Complexity is "the degree to which an innovation is perceived as relatively difficult to understand and use"(p. 257). Trialability is "the degree to which an innovation may be experimented with on a limited basis" (p.258). Observability is "the degree to which the results of an innovation are visible to others" (p. 258). Specifically, the study has four objectives:

1. describe college students' OER experience (OER usage status, channel to get to know OER, purpose of using OER, frequency of using OER, and most frequently used OER content);
2. describe college students according to their perceived attributes of OER;
3. examine the impact of gender on college students' perceived attributes of OER; and
4. examine the relationship between college students' OER experience and their perceived attributes.

## II. METHOD

### A. Sample

To The target population for this study were college students at the Zhejiang University (N=44800). Zhejiang

University (ZJU) was founded in 1897 and it is now one of the largest and comprehensive universities in China. Currently, ZJU has seven Faculties, which include 20 Colleges and cover 113 majors. Since 2003, ZJU actively participated in the CQC, PQC and VOC Projects. Between 2003 and 2010, ZJU has developed 64 CQCs and 124 POCs. In 2011, eight VOCs produced by ZJU were selected as part of the first group of 103 Chinese VOCs. Table 1 describes the distribution of these CQCs, POCs and VOCs by Faculties per year. And all of these courses are available on the National CQC online, the ZJU Quality Courses website, the ZJU Video Open Course website and/or other commercial websites.

### B. Design and measures

To measure college students' OER experience and their perceived attributes, we developed a research instrument consisting of a two-part questionnaire, which was designed based on the review of literature. The first part aimed at gathering participants' personal characteristics and their OER experience. OER experience is measured by five aspects: (1) OER usage experience; (2) channel to get to know OER; (3) purpose of using OER. Participants will be asked to indicate their purposes of using OER; (4) frequency of using OER; (5) most frequently used OER content. The second part of the instrument was designed to measure participants' perceptions about attributes of OER. Rogers' (2003) attributes of innovation were used as the theoretical base for this part. Moore and Benbasat's measurements of the main attributes of innovation were used and modified as the instrumental base for this part[15]. Three statements were used to measure each attribute of OER. Participants were asked to indicate their perceptions about the five attributes of OER by responding to a series of statements on a five-point Likert-type scale. The points on the scale were: 1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; and 5=Strongly Agree. The level of measurement for these variables was interval. In the subsequent analysis, we used the unweighted factor score as the final score for each attribute.

The survey instrument was reviewed and revised several times by four educational technology experts. At the same time, a group of graduate students majoring in educational technology was asked to read through the survey instrument to check whether there were some unclear statements for them. Internal reliability of each attribute of OER was tested and the Cronbach's Alpha coefficients of the five attributes were between 0.66 and 0.87: relative advantage (0.86); Compatibility (0.77); Complexity (0.86); Trialability (0.71); and Observability (0.66).

### C. Data Collection

According to the table of "Determining Sample Size for Research Activities"[16], the minimum sample size for our study should be 381. In the study, we planned to invite more than 1000 ZJU students to fill in the survey. Data were collected between 15 September and 15 November, 2012. 1200 ZJU students were randomly selected from the seven Faculties of ZJU. At the same time, the survey instrument was also put on the website. All participants were provided with written information introducing the nature and purpose of the research project. At the same time, all participants were told that they could choose not to fill in part or all of the survey. Finally, we got 1239 useful surveys back. The collected data were analyzed

using the Statistical Package for Social Sciences (SPSS17.0). Descriptive statistics were used to describe each variable. Correlation analysis was used to examine relationships among different variables. Alpha for all statistical procedures was set a priori at .05.

III. FINDINGS

Among the 1239 participating ZJU students, 611 (49.3%) were male and 628 (50.7%) were female; 172 (13.9%) were freshman, 193 (15.6%) were sophomore, 253 (20.4%) were junior, 244 (19.7%) were senior, 249 (20.1%) were master students, 128 (10.3%) were doctoral students.

Objective one was to describe college students' experience about OER. The study found that, 327 (26.4%) of participating ZJU students indicated that they had viewed the National CQC online, 584 (47.1%) had viewed ZJU Quality Course website, 145 (11.7%) had viewed ZJU Video Open Course website, and 624 (50.4%) had visited other OER websites (such as <http://www.icourses.edu.cn/>, etc.). Totally, 976 (78.8%) participating ZJU students had OER usage experience and 263 (21.6%) had no OER usage experience.

As to the channel to get to know OER, 438 (37.1%) indicated that they got to know OER because their teacher introduced, 395 (32%) from search engine, 374 (30.3%) from university website, 281 (22.8%) from other students, 176 (14.3%) from university or college advocate, and 176 (14.3%) from other channels.

As to purpose of using OER, more than half (59.75%) indicated that they used OER to assist their personal learning, 484 (39.4%) used OER to get to know other major's knowledge, 383 (31.1%) used OER to view international prestigious scholars' presentation, 207 (16.8%) used OER to view Chinese prestigious scholars' presentation, 153 (12.4%) used OER for other purposes.

As to frequencies of using OER, 437 (35%) indicated that they used OER monthly, 287 (23%) used OER weekly, 55 (5%) used OER daily, very few students (1%) used OER many times per day, and 443 (36%) indicated that they used OER according to other frequencies.

As to most frequently used OER content, 742 (60.2%) listed video, 556 (45.1%) listed text, 247 (20%) listed syllabus, 216 (17.5%) listed BBS, and 153 (12.4%) listed other contents.

Objective two was to describe college students according to their perceptions about attributes of OER. Table 1 shows the mean and standard deviation of the five attributes: (1) relative advantage: M=3.95, SD=0.67; (2) compatibility, M=3.91, SD=0.64; (3) complexity, M=3.34, SD=0.76; (4) trialability, M=3.36, SD=0.78; and (5) Observability, M=3.43, SD=0.67. Generally speaking, ZJU students tended to agree with the existence of relative advantage and compatibility of OER, while they tended to keep neutral attitude toward the existence of complexity, trialability and observability of OER.

Objective three was to examine the impact of gender on college students' perceived attributes of OER. As Table II shows, the "gender" factor has no significant impact on participating ZJU students' perceptions about all of the five attributes of OER. Male students and female students had similar perceptions about attributes of OER.

TABLE I.  
PARTICIPATING ZJU STUDENTS' PERCEIVED ATTRIBUTES OF OER (N=1239)

Statements describing Attributes of OER	Number	Mean	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>Relative advantage (M=3.95, SD=0.67)</b>							
Using OER enriches my learning resources.	1198	3.86	13	34	284	643	224
Using OER gives me access to high quality learning resources.	1198	4.02	8	19	201	678	292
Using OER allows me to learn without limited by time and space.	1198	3.96	10	21	243	658	266
<b>Compatibility (M=3.91, SD=0.64)</b>							
I like the idea of OER and what it brings to me.	1198	4.06	7	15	202	651	323
I want more OER.	1197	4.06	6	20	216	608	347
OER satisfies my needs for high quality instructional resources.	1198	3.61	14	67	450	504	163
<b>Complexity (M=3.34, SD=0.76)</b>							
It is easy for me to find OER resources on the Internet.	1198	3.35	23	144	531	396	104
I can easily access OER contents on the internet.	1197	3.37	21	148	486	454	88
It is easy for me to access menu items on the websites of OER.	1198	3.32	19	164	514	418	83
<b>Trialability (M=3.36, SD=0.78)</b>							
I have tried to renew resources on the websites of OER (such as video, syllabus and etc.).	1198	3.69	26	92	267	659	154
I have tried to download contents from websites of OER.	1198	3.39	51	204	314	490	139
I have used some other functions of OER sites (such as forum, test and etc.).	1198	3.02	73	316	401	335	73
<b>Observability (M=3.43, SD=0.67)</b>							
I know many people who are using OER.	1198	2.94	81	302	487	259	69
I know the advantages of OER (such as no charge, openness, and etc.).	1198	3.81	17	36	274	701	170
I know the disadvantages of OER (such as content novelty, quality of video, and etc.).	1198	3.53	21	85	448	529	115

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

TABLE II.  
DISTRIBUTION OF PARTICIPATING ZJU STUDENTS' PERCEPTIONS ABOUT ATTRIBUTES OF OER BY GENDER (N=1239)

Attributes of OER	gender	N	M	SD	DF	t	p
Relative advantage	Male	594	3.92	0.72	1166	1.39	0.17
	Female	604	3.97	0.62			
Compatibility	Male	593	3.89	0.66	1195	1.45	0.15
	Female	604	3.94	0.62			
Complexity	Male	594	3.31	0.78	1195	1.38	0.17
	Female	603	3.37	0.74			
Trialability	Male	594	3.39	0.80	1196	0.98	0.33
	Female	604	3.34	0.75			
Observability	Male	594	3.41	0.68	1196	0.83	0.41
	Female	604	3.44	0.66			

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

TABLE III.  
DISTRIBUTION OF PARTICIPATING ZJU STUDENTS' PERCEIVED ATTRIBUTES OF OER BY OER USAGE EXPERIENCE (N=1239)

Attributes	OER usage experience	N	M	SD	DF	t	p
Relative advantage	Have	955	4.01	0.63	1196	5.61**	0.00
	Have no	243	3.71	0.76			
Compatibility	Have	955	3.96	0.61	1195	4.50**	0.00
	Have no	242	3.73	0.72			
Complexity	Have	955	3.39	0.75	1195	3.79**	0.00
	Have no	242	3.18	0.77			
Trialability	Have	955	3.43	0.74	1196	5.59**	0.00
	Have no	243	3.09	0.87			
Observability	Have	955	3.48	0.64	1196	4.86**	0.00
	Have no	243	3.23	0.74			

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree; \*\*Correlation is significant at p < .01

Objective four was to examine the relationship between college students' OER experience and their perceived attributes. As table III shows, the "OER experience" factor has significant impact on participating ZJU students' perceptions about all of the five attributes of OER (p < .05): (1) relative advantage,  $t(1196)=5.61$ ; (2) compatibility,  $t(1195)=4.50$ ; (3) complexity,  $t(1195)=3.79$ ; (4) trialability,  $t(1196)=5.59$ ; and (5) ob-

servability,  $t(1196)=4.86$ . Students who had OER usage experience tended to more agree with the existence of all of the five attributes of OER than did students who had no OER usage experience.

#### IV. DISCUSSION AND IMPLICATIONS

The study found that more than three fourth of participating ZJU students had OER usage experience. The major channels for students to get to know OER were teachers, search engine, university website and other students. The major purposes for students to use OER are assisting their personal learning, followed by getting to know other major's knowledge, viewing international and Chinese prestigious scholars' presentation. About one third of ZJU students used OER monthly, about one fourth used OER weekly, and very few students used OER daily or even more frequently. Students indicated that the most frequently used OER content is video, followed by text, syllabus, and BBS. The findings are quite exciting because it indicates that the majority of surveyed college students had OER usage experience and university and faculty members played an important role in guiding students to use OER. This seems to suggest that, to propel the OER movement around the world, university and faculty members, as influential change agents, could play more important role in diffusing the innovative concept of OER.

The study found that the majority of participating ZJU students tended to agree with the existence of perceived relative advantage and compatibility of OER, while they tended to less agree with the existence of perceived complexity, trialability and observability of OER. According to Roger's theory of diffusion of innovation, the perceived attributes of an innovation would have significant impact on the rate of innovation adoption. The result of the study suggests that, to increase the rate of OER adoption, OER providers need to increase the perceived complexity, trialability and observability of OER.

The study found that gender has no significant influence on college students' perceptions about all of the five attributes of OER, while college students' OER usage experience has significant impact on participating ZJU students' perceptions about all of the five attributes of OER. Students who had OER usage experience tended to more agree with the existence of all of the five attributes of OER than did students who had no OER usage experience. Such findings concurred with Rogers' viewpoint about previous practice as an influential factor impacting one's perception about attributes of an innovation. The findings indicate that more OER-related practice might be used to increase potential adopters' perceived attributes of OER.

#### V. CONCLUSION AND LIMITATIONS OF THE STUDY

The study explored college students' OER experience and their perceptions about attributes of OER. The study found some exciting findings, for example, the university has high percentage of college students who had OER usage experience; students tended to have strong agreement with perceived relative advantage and compatibility of OER. At the same time, the study also found some challengeable issues. Perceived trialability, complexity and observability of OER are not satisfactory. Having OER usage experience or not would significantly impact on students' perception about attributes of OER. Although

these findings provide some evidences that help explain the current status of OER development in developing countries like China, the findings did not show any cause-and-effect relationships, nor can they be generalized. Due to time and other contextual limitations, the study only explored a small group of Chinese college students in a comprehensive university. Considering there are thousands of universities in China and the existence of dramatic differences among different universities, the results could not provide a whole picture of Chinese college students' OER usage status and their perceptions about OER. Further research should be carried out to explore college students' usage status and their perceptions in a larger population or among some specific groups, such as students from normal universities, research-oriented universities or medical universities etc.

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