

Use of OpenCourseWare from the Viewpoint of Undergraduate Students: Case of OER for Physics Laboratory Experiments

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Abstract

Open Educational Resources (OER) and OpenCourseWare (OCW) has emerged as an act targeting the barriers of education and learning by sharing knowledge for free for the benefit of self-learners, educators and students. This study aims to determine the attitudes of undergraduate students toward using OER prepared for General Physics Laboratory, how they perceive the contribution on the learning outcomes and what they suggest for improvement. The resources in question were designed to encourage students to review experiments before sessions. However, the usage is not a requirement of course completion rather OER are suggested as complementary materials. Results indicated that students, who used resources, experienced the benefits to their learning process. In line with the aim of the resources, they facilitated preparedness for the course. However, students expect to see other course materials that are covered through the course.

Keywords

Open Educational Resources, OpenCourseWare, Students' perspective

Introduction

The rapid developments in technology and its influences on the society bring both opportunities and challenges to educational area one of which is using the Internet in education. Educational institutions have been using the Internet for several years to develop and distribute resources. Nevertheless, most of these resources are not reachable or not public use (OECD, 2007).

At this point, Open Educational Resources (OER) or Open Courseware material (OCW) is an emerging movement that aims to destroy the barriers, to share knowledge free and to make knowledge reachable for everyone (OECD, 2007; Kursun, 2011). OER targets availability of entire sum of human knowledge for free to anybody, any place, any time (Matkin, 2005). OCW has emerged as an act addressing life-long learning by sharing educational resources online in favor of self-learners and improvement of education quality by guiding educators as well as providing complementary resources for students and defined as a digital collection of educational resources designed as courses (OCWConsortium, 2013).

METU OpenCourseWare

Middle East Technical University (METU), being a member of International and National OCW Consortiums, is an active contributor of OCW act and in 2008 OCW portal (<http://ocw.metu.edu.tr>) was established as the pioneer in Turkey. Since then Instructional Technology Support Office (ITS), which is one of the administrative units of METU, provides assistance to academic staff for publishing of courses as OCW. Instructors who are willing to

share their course materials contact ITS and resources are prepared to be published. The scope of course contents depends on the instructor's enthusiasm to share and diverges from syllabus and weekly schedule to enriched educational materials including lecture notes, assignments, additional resources and video lectures. Instructors already have lecture notes and assignments while video lectures are recorded by ITS. After the approval of the instructor, courses are opened for public use. All educational resources presented are licensed with Creative Commons Attribution-NonCommercial-ShareAlike License.

With the voluntary contribution of instructors, the number of courses published has reached to 110 by 2013. Since the language of instruction in METU is English, most of the courses are in English, while there are 12 courses in Turkish. Yet, majority of courses in Turkish are translated from English courses published by prestigious universities within the scope of National OCW project run by National OCW Consortium. As an expected outcome of the effort to share knowledge to contribute teaching and learning process, METU OCW has been viewed by approximately 90 000 unique visitors each year. Although the countries of visitors vary from United States to Philippines, the majority of them are from Turkey.

Literature Review

OECD, foreseeing OER as a major educational tool, listed the reasons for sharing knowledge for free from perspectives of stakeholders. Institutions were prone to share as it is in line with academic tradition, means leverage of taxes, may result in quality improvement, and elevates public relations and promotion. Moreover, faculty and researchers were eager to share since sharing complies academic values and may provide publicity and reputation (OECD, 2007). Caswell and colleagues provided the initial steps through institutional involvement and required support for establishing OCW. Moreover, they underlined the benefits and barriers of OCW for institutions, teachers and learners (Caswell, Henson, Jensen, & Wiley, 2008). Smith and colleagues also reported barriers for adoption of OCW as economic at institutional level, intellectual property rights, faculty members' attitudes towards sharing and digital divide in terms of technology reach (Smith & Casserly, 2006). Realizing Smith and colleagues, copyright issues were pointed to be the greatest concern about OER along with sustainability issues (Hysten, Van Damme, Mulder, & D'Antoni, 2012). Despite the effect of digital divide in terms of availability of technology and Internet, OCW movement still manage to succeed in helping faculty members to enhance teaching environments (Kasraie, 2012).

On the other hand, incentives were listed as support for institutional branding, students' appreciation and faculty motivation (Smith & Casserly, 2006). Supportive results have found on the effect of OCW on branding of institutions. Respondents of TU Delft (TUD) pointed out that they visited OCW to gather information about studying TUD as the second forerunning theme following increasing the knowledge of their expertise (Dopper, 2011). OCW Consortium Europe surveyed higher education institutions to identify best practices of implementing and use of OER/OCW and reported the factors facilitating OER/OCW initiatives as institutional factors including encouragement, policy-making, providing resources and incentives and faculty members' positive attitudes. On the contrary, lack of support, negative attitudes of faculty, intellectual property challenges, difficulty of reaching high quality open resources for reuse (Tovar & Zamora, 2012).

In order to identify the reasons which contribute and prevent use of OCW by public, a study was conducted and researchers found that the population sample they have reached were mainly self-learners for whom incentives to use OCW were self-directed learning, convenience and quality while disincentives were lack of support, certification, content and resource (Arendth & Shelton, 2009). Among ways of potential benefits of open resources, usage as supplementary materials to enable understanding was mentioned (Smith & Casserly, 2006). MIT students' main motives to use OCW were particularly preview of course before enrolment, supplement on-campus courses and review past courses (Matkin, 2005). Parallel to that, researchers concluded that open resources are being used to support traditional teaching (Tovar & Zamora, 2012). Among 28 countries responded to OECD questionnaire in 2011, the most relevant advantages of using OER were the opportunity of open and flexible learning environments and increased quality and efficiency of learning materials (Huyen, Van Damme, Mulder, & D'Antoni, 2012). Users of Tufts University OCW mentioned that they have visited the site for personal learning, supporting an in-class course, decision of enrolment and keeping knowledge up-to-date (Tufts OCW Newsletter, 2011). OCW Consortium recently released a user feedback report where to help studying for a course, to supplement teaching materials, to benefit for specific projects, to update skills or knowledge and to fulfill personal interests were listed as ways of using OCW (OCW User Feedback Report, 2013).

The research on OER and OCW has focused on benefits and challenges for using the resources as well as preparing them. Yet, to discuss the contribution of these open resources to the education, the perspective of end-users has received little attention. Moreover, those studies focused on the overall effect of OCW rather than examining the actual effect of a specific course. This study aims to determine the attitudes of undergraduate students toward using General Physics Laboratory resources and how they perceive the contribution of using the resources on the outcomes of the course. Moreover, suggestions of students for improvement of the resources are introduced.

Methods

Participants

This study was conducted in spring semester of 2012 – 2013 academic year. 710 (296 female and 411 male) undergraduate students enrolled in General Physics course replied to a paper-based survey. Nearly all (97.7%) of the participants were freshmen since General Physics is a must course in first-year curriculum (Table 1). Majority (74.5%) of the participants were students of Faculty of Engineering (Table 2).

Table 1. Class distribution of participants

Year	Frequency	Percent	Cumulative Percent
1 st	694	97.7	97.7
2 nd	9	1.3	99.0
3 rd	5	.7	99.7
4 th	2	.3	100.0
Total	710	100.0	

General Physics Laboratory Experiments

General Physics Laboratory is a part of General Physics courses which are two-semester courses and mandatory for majority of undergraduate students in METU. Each semester students are

obliged to attend laboratory sessions and conduct 5 experiments. For the effectiveness of laboratory intervention, preparedness of students is thought to be the key factor. To encourage students to review experiments before laboratory sessions, Department of Physics and ITS collaborated to design and develop video recordings of experiments. Teaching assistants conducted each experiment in front of the camera, voiceover was recorded and afterwards recordings were edited. Registered students of General Physics courses were informed by teaching assistants and flyers distributed in the laboratories. However, the usage is not a requirement of course completion rather OER are suggested as complementary materials.

While the official education language in METU is English, to increase the number audiences who may benefit, videos were dubbed in Turkish and English. Turkish version has been online since October 2011 whereas English version has been available since February 2012. Between March 2012 and November 2013, 41193 and 23675 activities of guest users were logged for Turkish and English recordings respectively.

Table 2. Faculty distribution of participants

Faculty	Frequency	Percent	Cumulative Percent
Education	68	9.6	9.6
Engineering	529	74.5	84.1
Art and Science	113	15.9	100.0
Total	710	100.0	

Data Collection and Analysis

Data of the study were collected at the end of the semester via printed survey developed by the researchers. The survey consisted of 18 questions. 8 questions were asked to obtain descriptive information about students and 10 questions were asked to understand how the students used the system and its benefits for students. While 15 questions were multiple choices that SPSS software was used to analyze them; 3 of them were open-ended that qualitative data analysis was used to analyze and create themes.

Results

OCW Awareness and Source of Awareness

Participants were asked whether they were aware of General Physics Laboratory resources published in METU OCW portal. In addition, from a list including flyers, peers, teaching assistants, instructor, media and other, participants were asked to select sources of information and multiple selection was allowed.

Table 3. Participant responses to sources of information about OCW

Source of Information	Frequency	Percent
Teaching Assistants	263	37.0
Flyers	165	23.2
Peers	141	19.9
Instructor	49	6.9
Other	28	3.9
Media	9	1.3

76.2% of participants indicated that they were aware of OCW whereas remaining participants have not heard of OCW. Teaching assistants, flyers and peers were the most frequent sources of information whereas instructor was one of the least frequent source (Table 3). Moreover, 23 participants noted other sources of information and they reported that they have discovered the resources by themselves via online search or social network sites and during surfing OCW portal.

OCW Usage, Frequency and Purpose of Usage

Usage of General Physics Laboratory resources was asked to students. Students who affirmed using the resources were asked to state the frequency of usage and remark the purpose of usage. The question for the frequency of usage was also built to gather when students preferred to use. Among 706 (99.4%) participants answering the question, 287 (40.4%) of them stated that they used OCW while 419 (59.0%) students stated that they did not use the resources. 110 (41%) participants, who answered, stated that they have used OCW resources for each laboratory session, 134 (50%) participants stated that they used resources for some sessions and 24 (9%) participants mentioned using resources for a few times. Moreover, majority of responders (82.1%) preferred using resources before sessions, while 7.1% expressed usage both before and after and only 1.8% used resources after sessions. Parallel to this findings, the dominant reason of usage (90.4%) was to be prepared for experiments among 270 participants responded to the question (Table 4).

Table 4. Distribution of reasons of OCW use

Reasons of Usage	Frequency	Percent	Valid Percent
Readiness for experiments	244	34.4	90.4
Both readiness and review	14	2.0	5.2
Review of experiments	9	1.3	3.3
Other	3	.4	1.1
Total	270	38.0	100.0

Contribution of OCW

Perception of participants about contribution of OCW to their learning process was questioned. They were also asked to specify the contribution by selecting among assisted for effective experiments, reduced the time required to conduct experiments, enabled comprehension of experiments, reduced number of questions to teaching assistant, improved grade. Multiple selections were allowed.

272 participants responded educational contribution of OCW question and 91.9% of them affirmed the positive contribution of OCW resources. The most frequently selected contributions were on conducting experiments effectively and easiness of comprehension, 21.8% and 21.3% of participants chose them respectively. Also 16.5% of responders mentioned that the resources helped reducing the time spent for experiments. On the other hand, relatively smaller groups, 10.6% and 5.8% respectively, of participants believed that OCW resources reduced the number of questions asked to teaching assistants and improved grades (Table 5).

Table 5. Distribution of contribution of OCW responses

Contribution of OCW	Frequency	Percent
Assisted for effective experiments	155	21.8
Enabled comprehension	151	21.3
Reduced the time required	117	16.5
Reduced number of questions	75	10.6
Improved grade	41	5.8
Other	3	.4

Advantages of OCW

109 participants noted advantages of OCW as response to the related open-ended question. The most common theme mentioned by participants was that OCW resources enabled the preparedness to experiments (Table 6). The second advantage that was underlined by participants was facilitative effect of OCW resources on comprehension. Moreover, OCW resources were pointed out to reduce time required to complete laboratory activities and increase effectiveness of those activities. A few students also mentioned increased memorability and improved grades as advantages of OCW.

Table 6. Frequency of mentioned advantages of OCW

Advantage of OCW	Frequency
Enabled the preparedness to experiments	64
Enabled comprehension	39
Reduced the time required	21
Increased effectiveness	17
Enabled safer experiments	3
Improved grade	2
Increased memorability	1

Reasons of OCW Not Being Effective

One of the open-ended questions was to investigate why students thought that OCW was not effective and only 16 participants responded. The common topic, mentioned by 6 participants, was about the content of video materials. They thought that the materials were superficial, focusing on how to conduct experiment without pointing the aim of it and not informative enough. Furthermore, the narration of the experiments is thought to be fast, fuzzy, ineffective and insignificant. Yet, other students mentioned since the experiments are being conducted in the laboratory and teaching assistants review the experiment beforehand, other resources even reports and quizzes were unnecessary and ineffective. 3 students underlined that since the experiments were not complex, they did not need supportive materials.

Reasons for Not to Use OCW

The participants who implied that they did not use the resources were asked to note the reasons as the last question of the survey.

288 of 419 participants responded to the open-ended question. The most common topic, which was mentioned by 103 participants, was lack of need for the resources. Supporting that response, satisfactory course resources including books, laboratory manuals and assistance of teaching staff as well as use of other resources were other reasons mentioned. Other reasons emerged were not being informed, shortness of time, and unattractiveness of OCW (Table 7).

Table 7. Distribution of reasons for not to use OCW.

Reasons for Neglect	Frequency	Percent
Lack of need	103	14.5
Not being informed	88	12.4
Shortness of time	45	6.3
Satisfactory resources	19	2.7
Indifference to course	13	1.8
Unattractiveness	13	1.8
Other	4	.6
Use of other resources	2	.3
Did not come to mind	1	.1

Improvement Suggestions

Suggestions of students for improvement of OCW resources were investigated by an open-ended question and 43 participants responded. The main theme was about the content of the resources. Participants stated that content needs to include more details such as the goals and results of experiments, more resources need to be added explaining laboratory reports and calculations, examples of quizzes could be provided. In addition, interactive resources like report preparing could help improvement of OCW. Furthermore, enhancement of audio and visual quality were other suggestions. Order of experiments presented in OCW portal was asked to be rearranged to be parallel to laboratory curriculum and resources should be up to date.

Discussion

OpenCourseWare (OCW) has emerged as an act addressing life-long learning by sharing knowledge free and by making educational materials reachable. OCW targets public use as well as educators and students. This study aims to clarify viewpoint of students on educational contribution of OCW.

In order to provide educational materials with the aim of helping students to be prepared for the sessions, General Physics Laboratory experiments were recorded and published online. Students who attended General Physics Laboratory sessions were administered a printed questionnaire to capture how OCW materials were used, what the benefits of materials were and any suggestions for improvement of materials.

With the help of teaching assistants, flyers and peers majority of the students have heard about OCW however, more than half of the students stated that they did not use the resources. Likewise, students of FGV Online, a Brazilian school, also reported peers as source of

information accompanied with online search (OCW User Feedback Report, 2013). This finding implies that a larger proportion of Brazilian students reported that they have found the resources via online search compared to METU students. The primary reason for not to use resources was the lack of need for additional resources. They believed that available course materials and assistance of teaching assistants were satisfactory for the expected success. In addition some students mentioned that they were not informed of OCW, short of time and the resources were unattractive. Especially, the awareness of OCW, which has emerged as a reason of not using materials, has highlighted by OCW Consortium as well (OCW User Feedback Report, 2013). Similarly, lack of time was one of the reasons mentioned for reasons of not to use OER (Huyen, The Growing Importance of Open Educational Resources).

On the contrary, an overwhelming majority of students who adopted OCW stated using resources before sessions for either each experiment or some of them. Parallel to both the scheduling of use and purpose of the materials, students mentioned that they were using OCW to be ready for experiments. This usage trend is similar to the findings of FGV Online where students benefited OCW for quick review of subjects (OCW User Feedback Report, 2013). Moreover, they believed that OCW had a positive effect on learning process. The main contributions were increasing the effectiveness of experiments, facilitating comprehension and reducing time required to conduct experiments. Yet, few students mentioned improvement of grades. Similarly, the main theme among advantages of OCW was enabling preparedness to experiments followed by enabling comprehension.

Additionally, the coverage of content of OCW was the main criticism. Students expected a detailed and comprehensive content including information on reporting, examples of quizzes and supported by interactive materials. However, the content of the video materials were framed by coordinators of General Physics Laboratory and the expected observations were deliberately omitted as well as laboratory reports, in order to prevent replication of results without experimenting or careful observation. Moreover, necessity of an enhancement in the materials in terms of audio and video quality was among the suggestions provided by the students. This findings correspond to the findings of OCW Consortium. Responders of the survey have highlighted the need for involvement of various types of materials among the improvement suggestions (OCW User Feedback Report, 2013).

To summarize, students who used OCW as a complementary material of a traditional course, observed the benefits and pointed out contributions to their learning process. In the light of student responses and the construction of OCW materials, one can conclude that OCW facilitates preparedness for the course. Since the materials in question aims to help students to review experiments before sessions, they are more prone to accomplish their goal. However, to increase the benefit of OCW providing only video recordings seems insufficient; other course materials covered in the curriculum of the course should also be presented. Besides, that expectation corresponds to the definition of OCW which underlines the organization of high quality educational materials into courses. Therefore, it is important to enrich the available educational materials included in OCW. Thus, enrichment of materials should be accompanied with high quality. As the technology advances, the expectations of users escalate. To fulfill the expectations, high quality audio and visual representations needs to be provided. That improvement may also impress the ones who mentioned unattractiveness as a reason of not using

OCW and convince them for usage. In case of the students who did not use OCW, the main problem was the sense of lack of need. The issue of neglect and being unmotivated caused by the belief and forejudges that one do not need is valid not only for OCW but any learning environment. Especially for complementary materials, learners should either feel the need or be obliged. To persuade them to use and increase the adoption of OCW, benefits of usage could be made more observable as suggested by Rogers (1995).

Limitations and Future Study

For future research, this study will be replicated after implementation of suggestions in order to examine the change in the attitudes of the students. Moreover, the observations provided by educators would be valuable. Instructors' and teaching assistants' experience and observations about the effect of using OCW on students' performance may be obtained. Since the OCW materials in question were developed to complement a course, participants of this study were the students who enrolled for that course. Though reaching the target population would be troublesome, to understand the contributions of OCW, self-learners and students who utilize the materials for educational purpose could be also considered as potential participants. Their evaluation may bring out other aspects that need to be improved.

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