Emerging Patterns of Online Video Lectures and Handheld Mobile Devices Use for Exam Preparation

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Abstract

Course Websites are one of the major instruments that students in higher education use for studying for exams. This study examines use patterns of online video lectures via personal computing and handheld mobile devices. It measures objective data of actual pageviews as recorded by Google Analytics, and uses data analytics for investigating the behavior of 6,617 undergraduate and graduate students of The Open University of Israel during the exam week. The study investigated three exam dates of 10 courses that took place in the summer of 2013, shortly after handheld mobile online-video viewing was offered in all the courses. The results indicate the relatively low diffusion of the handheld mobile access and its scant use for video viewing. Students who used handheld mobile devices were more inclined to view online video lectures. Interestingly, students used their handheld mobile devices to access the course homepage immediately after the exam. Our sample showed that after the exam about 28% of the pageviews were via handheld mobile devices, whereas on the week before the exam approximately 5% of the pageviews were through such devices. It suggests that handheld mobile access enables students to communicate with their peers and get valuable feedback on the exam.

Keywords: online video lectures, adoption patterns of online video-based learning, mobile learning, diffusion of innovation, online video as a means to prepare for exams.

Introduction

Course Websites have become a necessity in higher education, and are essential in distance and blended learning settings. This paper investigates two innovations that may improve the effectiveness of course Websites: online video lectures that provide students with a rich communication medium, similar to face-to-face learning (Copley, 2007; Geri, 2012; Guri-Rosenblit, 2009; Wieling & Hofman, 2010), and mobile learning that increases the accessibility to learning materials. Despite the growing ubiquity of handheld mobile devices, such as tablets and smartphones, they may not yet be suitable for all sorts of learning activities. Learning requires a relatively high cognitive effort, and students must usually pay attention, and concentrate on the delivered content. Although 44% of American cell phone owners have been using them for recording video (Duggan & Rainie, 2012), these were usually short clips, lasting a minute or two, or even less, unlike educational video lectures that are much longer. There are other inhibitors of handheld mobile devices use for learning, such as the small screens that may not be fit for certain types of content, the high prices of mobile internet surfing, the pace of downloading the data, and the need for electricity resources.

Theoretical Background and the Research Questions

Cognitive fit theory (Vessey, 1991) is a widely used theory in information systems research that suggests that the compatibility between task and information presentation format leads to superior task performance. Cognitive fit theory has been applied in mobile settings (Adipat, Zhang, & Zhou, 2011; Lee, Cheng, & Cheng, 2007).

There are two contradicting forces that may influence the use of online videos, and particularly its timing: on the one hand, there is attention – learning from video requires a lot of time and concentration. Thus, it is anticipated that as the exam day gets closer, students will tend to consume less video, on the other hand, procrastination may cause students to defer video viewing until the last day before the exam (Ariely & Wertenbroch, 2002; Gafni & Geri, 2010).

Mobile learning is an emerging trend, and providing students with access to course Websites, including online video, via handheld mobile devices may help them study during the semester, as well as support exam preparation (Brecht, 2012; Brecht & Ogilby, 2008; Steimberg et al., 2010; Whatley & Ahmad, 2007). However, handheld mobile technology common use for online video lectures viewing is relatively new, and it has its limitations. This exploratory study investigates the following research questions:

- Are online video lectures suitable for exam preparation?
- Are handheld mobile devices adequate for watching online video lectures for learning purposes?
- Are early adopters (Rogers, 2003) of handheld mobile devices for learning also early adopters of online video lectures viewing?

Methodology

The methodology of this study is data analytics (LaValle, Lesser, Shockley, Hopkins, & Kruschwitz, 2011), which is widely used in education research (Hershkovitz & Nachmias, 2009; Levy & Ramim, 2012). The study investigated diurnal (i.e., temporal) patterns (Gafni & Geri, 2013; Grinberg, Naaman, Shaw, & Lotan, 2013; Klepeis et al., 2001) of exam preparation. Rather than ask the students about their subjective perceptions, we measured the objective data of their actual use of course Websites, online video lectures, and handheld mobile devices during the week of the exam. The data was obtained from the Open University of Israel Website via Google Analytics (Clifton, 2012), and further analyzed with IBM® SPSS® Statistics.

Various sorts of online video lectures and tutorials are included in hundreds of the Open University course Websites. Until June 2013, the online videos were available only via personal computing devices (i.e., personal computers, including laptops and netbooks), but not via handheld mobile devices (i.e., smartphones and tablets). These two categories have different operating systems, which determine their ability to use certain versions of applications, including online video. For the purposes of this study, the category of personal computing devices includes stationary desktop computers, laptops and netbooks, because they are compatible in their ability to display online video (in technical terms: they all have a standard motherboard and similar operating systems). The second category, handheld mobile devices, includes devices that are based on other operating systems. Furthermore, smartphones and tablets are smaller and lighter than laptops and netbooks, so they offer a somewhat higher level of mobility.

Following a successful pilot, that validated the feasibility of offering students to view online video lectures via handheld mobile devices in sufficient quality (Geri, Gafni, & Winer, 2013),

this option was offered in all the courses toward the exam period of the 2013 spring semester (thereafter, 2013B).

Ten social sciences courses that offered asynchronous online video lectures on their Websites were selected for this study: three undergraduate courses in management and economics, three undergraduate courses in other social sciences (e.g., psychology, education, communications, and sociology), two graduate courses in business administration (MBA), and two graduate courses in other social sciences.

There are three alternative dates on which a student may take the exam: two dates immediately following the end of the semester (hereafter, A1 and A2), and one later date (B). Undergraduates may take the exam twice, either on A1 or A2, and exam B (or on the following semester). Graduates may take the exam only once, either on A1, A2, or B, and the purpose of offering three alternatives is flexibility and convenience. The courses that were selected for this study had at least seven days between exam A1 and exam A2. All courses had more than a month between exam A2 and exam B.

We collected data via Google Analytics (GA) on the pageviews of each of the 10 courses for the seven days before the exam. The exam date was defined as D0, the day before was D1, and so forth. The decision to measure seven days was made after a pilot study, which analyzed the 14 days prior to the exam, and indicated that the main use of the Websites was during the exam week. The number of pageviews was divided by the number of students who took the exam on that date in order to standardize the data and enable comparison (e.g., 750 pageviews one day before the exam of a course homepage, which had 250 students registered for exam A1, was standardized to 3 pageviews per student).
The main portal of a course Website is its homepage, which contains links to functional pages, such as the forum (discussion groups) main page, and the video main page. Four measures were examined for each of the 10 courses, in order to have two main dimensions of comparison:

- Pageviews via personal computing devices of the course homepage.
- Pageviews via personal computing devices of the course main video page (if there were two or more entry pages per course all of them were measured, and we used the aggregated result, this applies also to the handheld mobile data).
- Pageviews via handheld mobile devices of the course homepage.
- Pageviews via handheld mobile devices of the course main video page.

Furthermore, the pageviews of the homepage of four courses on D0 (the exam day), via personal computing and handheld mobile devices, were also measured separately for the hours before the exam (midnight until 16:00, which is the standard fixed time frame of the beginning of all the exams) and after the exam.

Results

The study examined course Website pageviews data of 10 courses, with three exam dates each, totaling 30 exam dates, for seven days by 6,617 students who took these exams. Table 1 summarizes the total pageviews for the whole sample. It shows that as the day of the exam approaches the use of the course Websites increases, and on the exam day it slightly decreases, except for accessing the course homepage via handheld mobile devices, which increases considerably. We shall further analyze this below. Two other observations are the relatively low diffusion of handheld mobile access (except for the exam day), as well as the scant use of online video via handheld mobile devices.

Table 1. Total pageviews of homepages and online video pages via personal computing and handheld mobile devices

Access mode and page	Day 0 Exam	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Personal computing Homepage	11,035	13,226	10,435	8,938	8,498	7,347	6,199	**65,678**
Personal computing Video	627	889	805	735	713	686	533	**4,988**
Handheld mobile Homepage	**2,093**	851	556	555	397	394	277	**5,123**
Handheld mobile Video	33	67	50	27	22	24	15	**238**

Table 2 presents total pageviews per student via personal computing and handheld mobile devices for the total six days before the exam, excluding the exam day (i.e., one day before until six days before the exam) for the whole sample of 6,617 students who took these exams. The handheld mobile to personal computing ratio (7.0%) of the video pageviews is larger than that ratio for the homepage pageviews (4.2%), which suggests that those students who use handheld mobile devices have higher proclivity to view online video. This is also demonstrated in Figure 1, which uses a logarithmic scale.

Table 2. Total pageviews per student via personal computing and handheld mobile devices on one-to-six days before the exam

Access mode / Page	Personal computing	Handheld mobile	Ratio: HM/PC
Homepage pageviews	350.4	14.6	4.2%
Video page Pageviews	24.4	1.7	7.0%
Ratio: V/H	7.0%	11.6%	

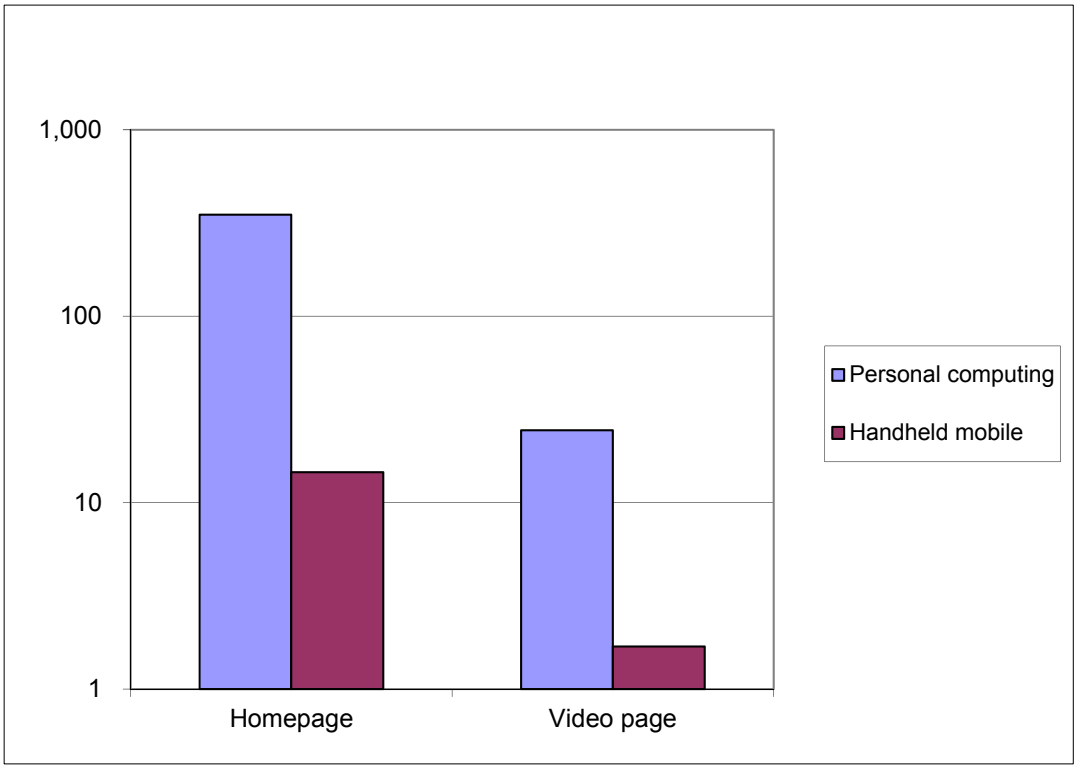

Figure 1. Total pageviews per student via personal computing and handheld mobile devices (logarithmic scale)

As shown in Table 1, the pageviews of the course homepages via handheld mobile devices on the exam day (D0) were exceptionally high. Table 3 and Figure 2 present the pageviews of the homepages of four courses on D0, via personal computing and handheld mobile devices, before and after the exam. The tendency of students to use handheld mobile devices after the exam (27.7%) for accessing the course homepage was significantly stronger than before the exam (5.4%), $\chi^2(1, N = 7{,}016) = 530.4$, $p < .0001$.

Table 3. Total pageviews of courses' homepage via personal computing and handheld mobile devices before and after the exam

Access mode	Personal computing	Handheld mobile	Total	% Handheld mobile
Before the exam	2,529	143	2,672	5.4%
After the exam	3,142	1,202	4,344	27.7%
Total	5,671	1,345	7,016	19.1%

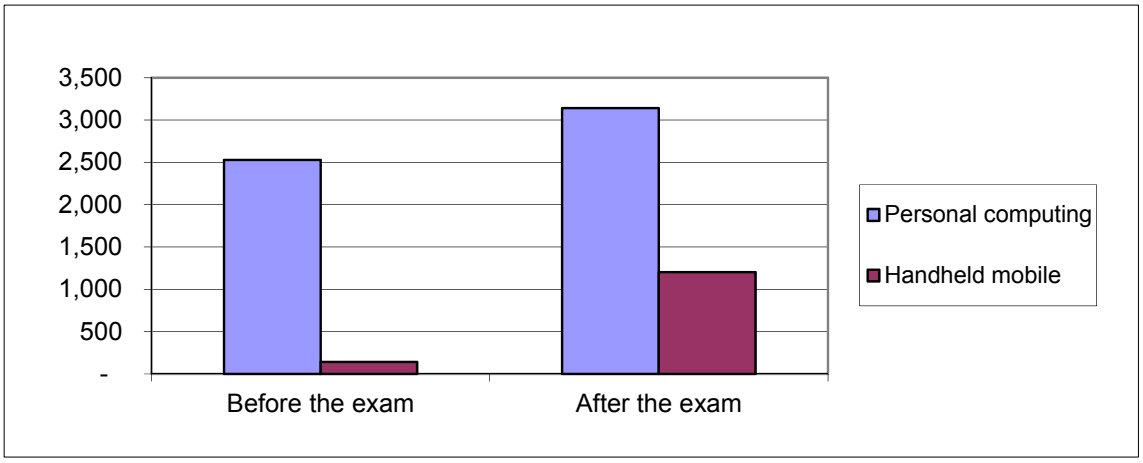

Figure 2. Total pageviews per student via personal computing and handheld mobile devices before and after the exam

Discussion and Conclusions

The results indicate the current relatively low diffusion of handheld mobile access and its limited use for viewing video lectures. Nevertheless, students who used handheld mobile access were more inclined to view online video lectures. Our findings suggest that the "innovators" and "early adopters" (Rogers, 2003) among the students are already using handheld mobile access to video for learning. Nevertheless, these initial findings require corroboration by further research. The socially engaging rich video format renders it as an important instrument for mobile learning. As generally happens with new technologies, the prices of mobile internet surfing will keep declining, and at some future point there will be adequate solutions for the required electricity resources. The current challenge is to improve the pedagogic aspects of mobile video learning.

Exceptionally, many students used their handheld mobile devices to access the course homepage immediately after the exam. Our sample showed that after the exam about 28% of the homepage pageviews were via handheld mobile devices, whereas on the week before the exam approximately 5% of the pageviews were through handheld mobile devices. In order to interpret this finding it should be noted that unlike other academic institutions, the students of The Open University cannot meet their peers face-to-face right after the exam, and discuss it, because the exams at The Open University are taking place simultaneously in dozens of exam centers, which are geographically dispersed from Eilat to the Golan Heights. The relatively high use of the handheld mobile devices right after the exam proposes that such access provides the students with immediate communication with their peers for getting valuable feedback on the exam.

Both the infrastructure and the experience that the Open University is gaining as the demand for mobile learning via handheld devices, including viewing online video lectures, gradually emerges, are preparing the university for providing effective service to the students on a large scale.

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