

# **Worldwide Video Use Patterns in e-Learning: Exploring time, completion rate, and devices**

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## **Abstract**

*Academic institutes harness technology in order to provide new options for students to learn. One of these technologies is offering video classes that can be seen through the Internet, using different kinds of devices, like personal computers, tablets or smartphones. This research inspects the differences in usage patterns of watching video lectures, by students in fifteen academic institutes, in three different countries: The USA, the UK and Australia. The usage patterns inspected were the type of device used, period during the semester when the videos were played and drop-off percentage. The possibility to watch anywhere and anytime, not needing to attend personally the classroom, opens a new trigger to procrastination. This research used objective data extracted from Kaltura's database, the supplier of the video infrastructure for those academic institutes, during one year (two semesters). Our findings showed that students worldwide prefer to watch online video classes using PCs, while the mobile devices are scarcely used; they prefer short videos, especially at the end of the semester, or they drop-off after a minimal number of minutes watching. Moreover, a U-shape curve of e-learning during the semester was observed, where the video watching was concentrated at the beginning and end of the semester.*

**Keywords:** online video lectures, m-learning, effectiveness of instructional technologies, distance learning, blended learning, procrastination, attention economy.

## **Introduction**

Academic institutions, i.e. universities and colleges, have been trying, during the last years, to provide their students learning material in accessible, convenient and feasible ways, such as online video lectures. Online video lectures are used in varied types of teaching, such as distance learning, blended learning, traditional face-to-face learning that migrates to blended models, MOOCs, etc. (Sherer & Shea, 2011). Online video lectures have become affordable and ubiquitous (Copley, 2007) and are successfully implemented in teaching (Brecht, 2012; Brecht & Ogilby, 2008; Whatley & Ahmad, 2007). The video lectures can be used when students cannot attend class (Wieling & Hofman, 2010), or as a helpful supporting tool (Steimberg, Guterman, Mermelstein, Brickner, R., Alberton & Sagi, 2010). The online video classes offer flexibility in learning, giving the students the opportunity to personally adapt the pace of their studies, deciding when, where, what and how much to watch (Fricke and Agrawal, 2013). This flexibility is especially convenient for the Millennial or Y generation, students born between 1980 and 2000, who tend to be impatient, creative, expecting results immediately and their ability for attention is constantly getting shorter (Shipper, 2013, Fuegen, 2012). Moreover, this generation was born into the technology era, so the use of technology in order to study is inherent, and they prefer online studies (Roehling, Kooi, Dykema, Quisenberry, & Vandlen, 2011). However, the flexibility that online video lectures offer, can become a negative issue, leading to procrastination.

Procrastination, the tendency to postpone an activity under one's control to the last possible minute, and sometimes to not perform it at all (Ariely & Wertenbroch, 2002; Steel, 2007; van Eerde, 2003), is widely-studied in context of education all over the world (Ackerman & Gross, 2005; Cao, 2012; Kachgal, Hansen, & Nutter, 2001; Özer, Demir, & Ferrari, 2009; Wang, He, & Li, 2013). In prior studies, temporal use patterns of online video lectures were analyzed to find their implications for procrastination and e-learning processes (Grinberg, Naaman, Shaw, & Lotan, 2013). According to Geri, Gafni and Winner (2014b) the facilitation of online video lectures make it easy for students to procrastinate, generating a U-shape curve e-learning pattern, where the students allocate more time at the beginning and the end of the semester, while during the middle of the semester, their learning efforts decrease.

While facilitating online video lessons, the academic institutions allow students to watch the videos with any device. Students can consume the online video courses while being connected to the Internet, using personal computing devices (PCs), i.e., stationary desktop computers, laptops and netbooks; tablet computers or smartphones. The difference is determined by the size of the device's screen, the operating system facilities and the possibility of mobility. Mobile learning (m-learning) provides students with access to course materials, including online video, via handheld mobile devices (Brecht, 2012; Brecht & Ogilby, 2008; Steimberg et al., 2010; Whatley & Ahmad, 2007). The handheld devices, such as tablets and smartphones make it feasible, on the one hand, to be connected anytime-anywhere, making the access to the lessons flexible and portable, and allowing more efficient use of their time, such as while traveling or waiting that would otherwise be unavailable to them. These advantages contribute to the positive impression on the students (Fuegen, 2012). But, on the other hand, there are some inhibitors to the mobile devices use, such as the small screens that may not fit for certain types of content, the high prices of mobile internet surfing, the pace of downloading the data, and the frequent need for a battery charge (Barnes & Huff, 2003; Gafni, 2008). Moreover, handheld mobile technology and devices use for viewing online video lectures is relatively new, and users are gradually adopting these technologies (Pew Research Center, 2014), and it takes time for innovations to diffuse (Rogers, 2003).

The purpose of this study is to examine the differences in usage when consuming online video lectures using different kind of devices: personal computers (PCs), tablets and smartphones, in a worldwide perspective, using data accumulated about the usage of online video courses in academic learning institutions in The United States of America, The United Kingdom and Australia.

When comparing the behavior of students, specifically in their usage of video lectures during the semester, in different countries, there are some aspects that must be taken into consideration, such as culture differences, how people perceive learning, motivation, and the role of the learner and teacher (Yang, Olesova & Richardson, 2010; Richards & Bilgin, 2012; Cseh, Kumar & Cavallaro, 2012). Moreover, the penetration and adoption of new technologies and devices may be different in the various countries, thus affecting the usage of internet and mobile devices.

This study examines and compares some perspectives: differences between the behavior of students in several countries, differences in usage of videos during the semester, according to four periods, and differences between the devices used in order to watch the videos. The next section describes the research questions and corresponding hypotheses. Afterwards the

methodology used is specified. Subsequently the results are reported, followed by a discussion. Finally, practical implications, limitations and further research are described.

### **Research Questions and Hypotheses**

In this study, the following research questions about usage of online video lectures by students in USA, Australia and UK were examined:

1. Are the temporal use patterns along the semester different according to geographical locations?
2. What influence has the length of the video lecture on the watching patterns?
3. Are there any differences in usage patterns of online video lectures, according to the device used for watching the video (PC, tablet or smartphone)?

USA, Australia and UK are three modern and developed Western countries, with highly multicultural society and immigrants. According to Hofstede's culture survey (2014) the three countries are very similar, as can be seen in Table 1. The three are very individualistic societies, where people are supposed to look after themselves and their direct family only, and the route to happiness is through personal fulfillment. The three countries have also a similar score in indulgence. People in societies classified by a high score in indulgence generally exhibit a willingness to realize their impulses and desires with regard to enjoying life and having fun. They possess a positive attitude and have a tendency towards optimism. In addition, they place a higher degree of importance on leisure time, act as they please and spend money as they wish.

**Table 1 – Hofstede's culture scores**

<b>Dimension \ Country</b>	<b>USA</b>	<b>UK</b>	<b>Australia</b>
<b>Individualism</b>	91	89	90
<b>Indulgence</b>	68	69	71

According to the research of Richards and Bilgin (2012), who compared Australian and Singaporean students, some facts can deduct about the Australian students: (1) Australian students have an overall lack of awareness of time (and managing it); (2) Australian students are usually working as well as studying, however students claim that their studies have the first priority (3) Australian students found the learning activity extremely worthwhile.

According to Cseh, Kumar and Cavallaro (2012), the meaning of learning for UK people constitutes the conceptual development of the person. In USA learning is about thinking, mental processes and inquiry. The learner in the UK has individualistic values, independence, task efficacy, competition, self-esteem and social competence. In the USA the mental processes of the learner are important. Learners' qualities such as intelligence, cognitive skills, creativity and motivation are considered important. USA students are action oriented, have respect to deadlines and fast-pace. Australian students are motivated by getting ahead of others and being competitive and individualistic

The temporal patterns were examined according to the period of the semester in which the students watched the videos. The video lectures are available to the students during all the semester, they can decide to watch all of them at the beginning of the semester, spread them during the semester, or watch them at the end of the semester, while preparing for the exam. Prior studies found that online classes enable the students to procrastinate, because the materials are approachable any time (Spennemann, 2007; Gafni & Geri, 2010; Geri, Gafni, & Winer, 2014b). Considering the human's limited attention resources (Davenport & Beck, 2001), individuals must set their priorities, and rationally decide to postpone certain assignments, so not always procrastination is a negative operation (Chu & Choi, 2005). Geri, Gafni, and Winer, (2014b) found a U-shape curve in one university, explaining that students have limited attention and time resources, therefore the students decide to focus on studying mainly for the exam.

*The H1 hypothesis, deriving from the worldwide phenomena of procrastination and the cultural similarity of the three countries, is that the temporal patterns will be similar in Australia, UK and USA.*

Educational video lectures are relatively long. Szpunar, Moulton and Schacter (2013) performed a study about mind wandering and education, stating that although this phenomenon occurs frequently in classrooms, it is highly notable also during video-recorded lectures. They affirm that this happens because learning depends critically on attention, in ways other activities do not conclude that online lectures need to be short. Students, especially Y generation students, who are active learners and prefer learning via the use of technology (DiLullo, McGee & Kriebel, 2011), prefer short clips, as short as possible to make the point, to a maximum of three-five minutes unless the learning outcome requires a lengthier extract (Berk, 2009). Longer videos may lead to an increased drop-off before the video lecture ends.

*The H2a hypothesis of this work is that students will prefer to watch short videos, and*

*H2b hypothesis – the rate of completion will be higher when the video lessons are shorter.*

Compatibility between tasks to be performed, information format and environment of usage need to fit, according to the cognitive fit theory (Vessey, 1991). This is valid and must be applied also for mobile devices (Adipat, Zhang, & Zhou, 2011). On the one hand, people tend to perform more and more tasks via their handheld mobile devices, but, on the other hand, learning requires concentration, and therefore it may be best performed via PCs, in a quiet environment. Geri, Gafni and Winner (2014a) found that despite the growing ubiquity of handheld mobile devices, the mobile devices 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 they found a relatively limited use of handheld mobile devices for viewing video lectures, the students who used them were more inclined to view online video lectures during exam preparation.

*The H3a hypothesis in this work is that also worldwide, the students will prefer to watch the video lessons in a comfortable and quiet environment, using a PC with a regular size screen.*

In all the three countries, technologies were widely and almost equally penetrated, as can be seen in Table 2, as of March 2014 (TNS, 2014).

**Table 2 – Usage of technological devices, according to country population**

Device \ Country	USA	UK	Australia
PC	72.2%	75.7%	82.9%
Smartphone	57.3%	67.5%	66.2%
Tablet	34.9%	40.0%	38.9%

*The H3b hypothesis is that because the penetration of the technologies is very similar between the countries, there will not be differences in the devices used by the students.*

### **Methodology**

Most of prior studies on online learning (Michinov, Brunot, Le Bohec, Juhel, & Delaval, 2011; Rakes & Dunn, 2010) were based on surveys, in which students self-reported their perceptions. Other studies, such as Ariely and Wertenbroch (2002), used experiments. This study analyzed data accumulated by Kaltura (Kaltura, 2014), a company providing infrastructure for online video to web publishers, media companies, enterprises, educational institutions and service providers all over the world, which was recognized as a leader in The Forrester Wave™ report "Online Video Platforms, Q1 2013" (Karcher, Powers, & Smith, 2013). In this study the focus is on academic educational institutes providing online lectures to their students. The usage of these videos is monitored by Kaltura, and data is saved in their databases. This research was conducted using data analytics (LaValle, Lesser, Shockley, Hopkins, & Kruschwitz, 2011), which is widely used in education research (Hershkovitz & Nachmias, 2009; Levy & Ramim, 2012). The data were collected from Kaltura's database using API's and SQL queries aggregated and analyzed using Kaltura KMC Analytics, a data analytic tool, in order to analyze objective data. The aggregated data was finally exported to Excel and then to IBM SPSS Statistics 2.0, in order to analyze and exhibit it.

The data were collected from a sample of fifteen universities and colleges which use Kaltura's infrastructure to provide online video lectures to their students. The sample included institutions residing in the United States of America, the United Kingdom and Australia. Five institutions from each country composed the sample. These were the five institutions offering the greatest number of video lectures in each country. Unfortunately, the identification of the fifteen institutions cannot be provided due to business constraints.

The data were collected for one academic year, 2013, which is composed of two semesters. Each semester was divided into four periods, in order to measure temporal patterns, according to the definition in the study of Geri, Gafni and Winner (2014b) and the findings of Michinov et al. (2011):

- **Period 1** - The beginning of the semester, which included its first four weeks.
- **Period 2** - The mid-semester.

- **Period 3** - The end of the semester, from three weeks prior to the last day of the semester until one week before the exam.
- **Period 4** - The exam period.

In order to define these periods specifically for each institution, the academic year schedule, of the institutions compounding the sample, were extracted from the specific websites and analyzed.

The measures obtained and calculated from the database included:

- **Av. time watched (min)** – Average minutes watched - the average number of minutes that a student watched a specific video lecture, disjointedly to the length of the video lecture.
- **Av. % num videos watched** - The rate between the number of videos existing in the page to the number of videos watched from that page –each page can contain several video lectures. The student decides which videos to watch. There is no obligation to watch all the videos on the page. For example, if the page contains 6 different videos and the student watched only 2 of them, the rate will be 1/3.
- **Av. % completed** – Calculated from the average completion rate (25%, 50%, 75%, and 100%) obtained from the database – the average percent of the part of the video watched by the student before stopping.
- **Av. video length** - Average length of watched video – the average length of all the videos in the sampled institutions during the period examined.

Each of the measures was extracted according to the device in which the videos were played – Personal Computer (PC), smartphone or tablet. According to these data the following measures were calculated:

- **% Play on device** - The percentage of clicks on the "Play" button per device - calculated from the total number of clicks on the "Play" button during the given period.
- **% minutes watched on device** - The percentage of minutes viewed per device - calculated from the total number of minutes viewed during the given period.

## **Results**

The data accumulated and aggregated for 15 academic institutions, 5 in each country (Australia, United Kingdom and United States of America) is shown in table 3. The data is divided into four periods of the semester and according to the device used to watch the video lecture.

**Table 3 – Aggregated data of 15 institutions, according to country, period and device**

Country	Period	Device	% Play on device	% minutes watched on device	Av. time watched (min)	Av. % num videos watched	Av. % completed	Av. video length
Australia	1	PC	84.20%	83.18%	9.152	40.95%	69.40%	13.19
		Smartphone	3.88%	12.33%	8.251	41.20%	72.60%	11.37
		Tablet	11.92%	4.02%	15.306	40.48%	49.40%	30.98
	2	PC	77.89%	61.50%	4.327	40.67%	68.30%	6.34
		Smartphone	5.81%	37.00%	6.841	46.57%	74.10%	9.23
		Tablet	16.30%	1.40%	5.834	35.19%	33.60%	17.36
	3	PC	71.46%	72.30%	1.521	46.03%	78.40%	1.94
		Smartphone	9.18%	26.40%	1.396	45.75%	83.30%	1.68
		Tablet	19.35%	1.30%	0.886	36.87%	82.80%	1.07
	4	PC	69.95%	72.30%	1.521	43.03%	78.40%	1.94
		Smartphone	27.75%	26.40%	1.396	48.75%	83.30%	1.68
		Tablet	2.15%	1.30%	0.886	39.87%	82.80%	1.07
UK	1	PC	88.92%	84.56%	2.673	34.26%	53.40%	5.01
		Smartphone	6.02%	7.68%	3.728	32.08%	48.20%	7.73
		Tablet	5.66%	7.75%	4.031	35.20%	48.70%	8.28
	2	PC	88.92%	74.28%	1.857	34.67%	53.76%	5.22
		Smartphone	5.83%	12.66%	2.553	33.07%	48.07%	7.06
		Tablet	3.32%	12.00%	0.376	14.26%	52.60%	7.65
	3	PC	87.94%	84.70%	3.232	41.33%	55.00%	5.88
		Smartphone	6.41%	8.05%	4.264	37.06%	53.80%	7.93
		Tablet	5.65%	7.25%	4.324	44.20%	55.80%	7.75
	4	PC	89.03%	83.81%	3.032	40.38%	53.60%	5.66
		Smartphone	5.72%	9.73%	5.642	40.05%	53.80%	10.49
		Tablet	5.26%	6.47%	4.310	46.03%	54.50%	7.91
USA	1	PC	72.21%	79.60%	3.655	15.88%	54.90%	6.66
		Smartphone	17.16%	10.80%	2.515	15.43%	41.60%	6.05
		Tablet	10.47%	9.40%	3.169	21.71%	37.60%	8.43
	2	PC	70.21%	75.30%	3.320	13.60%	56.40%	5.89
		Smartphone	18.27%	12.10%	2.197	15.76%	36.30%	6.05
		Tablet	11.33%	12.40%	3.365	20.12%	41.20%	8.17
	3	PC	75.53%	75.50%	3.459	20.15%	52.60%	6.58
		Smartphone	15.44%	15.40%	3.021	22.20%	48.80%	6.19
		Tablet	8.86%	8.90%	3.312	28.50%	47.90%	6.91
	4	PC	63.40%	83.60%	2.626	17.97%	61.40%	4.28
		Smartphone	22.66%	4.30%	1.916	19.78%	37.00%	5.18
		Tablet	13.80%	12.10%	2.473	27.99%	44.80%	5.52

## Differences between devices

### % Play on device –

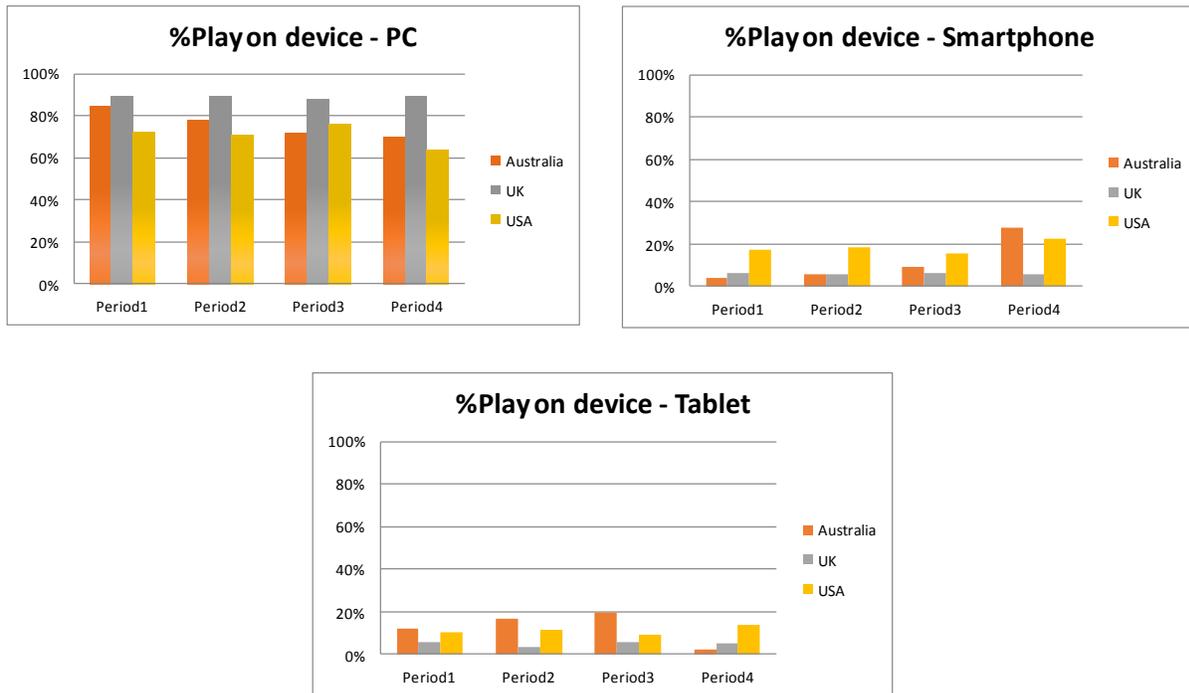
In all periods and countries, there was a statistical difference between the use of PCs as the main watching device, comparable to smartphones ( $t=18.95$ ,  $df=22$ ,  $sig=.000$ ) and tablets ( $t=22.57$ ,  $df=22$ ,  $sig=.000$ ). There was no difference found between the mobile devices - smartphones and tablets.

The differences of the % played on each device, according the countries are summarized in table 4. The use of PC in UK was statistically greater than in the other two countries. There were no statistical differences between the countries and between the periods in the use of smartphones and tablets.

The differences of the "% played on devices", according to the period of the semester, are shown in Figure 1. As can be seen, the preferred device to watch the video lessons is the PC. In the USA the use of smartphones is greater than in the other countries. Australian students change their preference according to the period in the semester, starting the semester using the PC, but moving to mobile devices towards the end of the semester. During the exam period (period 4) Australian students prefer the use of the smartphone. Tablets are more popular in Australia than in the other countries. UK students prefer the PC all over the semester.

**Table 4 – % played on each device, according to country**

<b>Device</b>	<b>PC</b>	<b>Smartphone</b>	<b>Tablet</b>
<b>Australia</b>	75.9%	11.7%	12.4%
<b>UK</b>	88.7%	6%	5%
<b>USA</b>	70.3%	18.4%	11.1%



**Figure 1: The usage of the devices, according to periods and countries**

**% minutes watched on the device -**

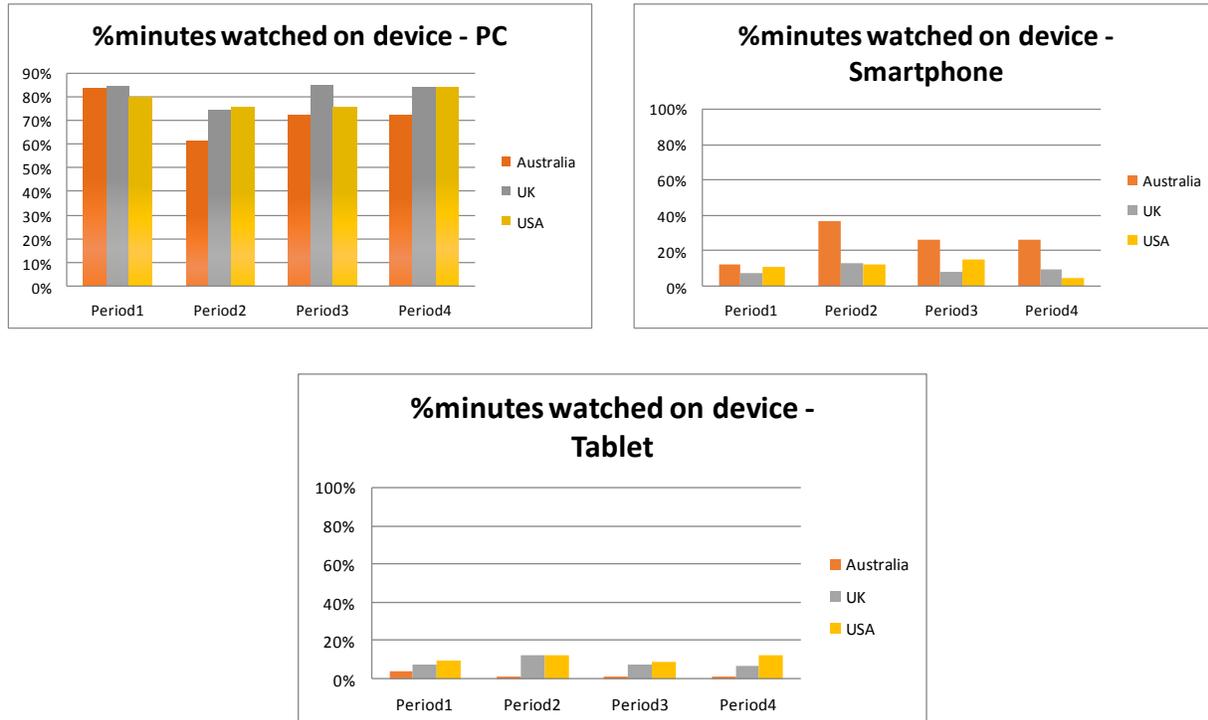
In all periods and countries, there was a significant difference between the use of PCs on which a larger time students watched the video lectures, comparing to smartphones ( $t=18.06$ ,  $df=22$ ,  $sig=.000$ ) and tablets ( $t=29.77$ ,  $df=22$ ,  $sig=.000$ ). There was also a difference between the mobile devices, Students watched on smartphones more than twice as time they watched using tablets ( $t=2.697$ ,  $df=22$ ,  $sig=.013$ ).

The differences of the % of minutes watched on each device, according the countries are summarized in table 5. There were no differences in the use of PCs between the countries. The use of smartphones was greater in Australia (25.5%), compared with UK (9.5%) and USA (10.7%), while it was statistically the same between UK and USA. The use of tablets was greater in Australia (20%), compared with UK (8.5%) and USA (10.7%), while it was statistically the same between UK and USA.

**Table 5 – % minutes watched on each device, according to country**

Country\Device	PC	Smartphone	Tablet
<b>Australia</b>	72.4%	25.5%	20%
<b>UK</b>	82%	9.5%	8.5%
<b>USA</b>	78.6%	10.7%	10.7%

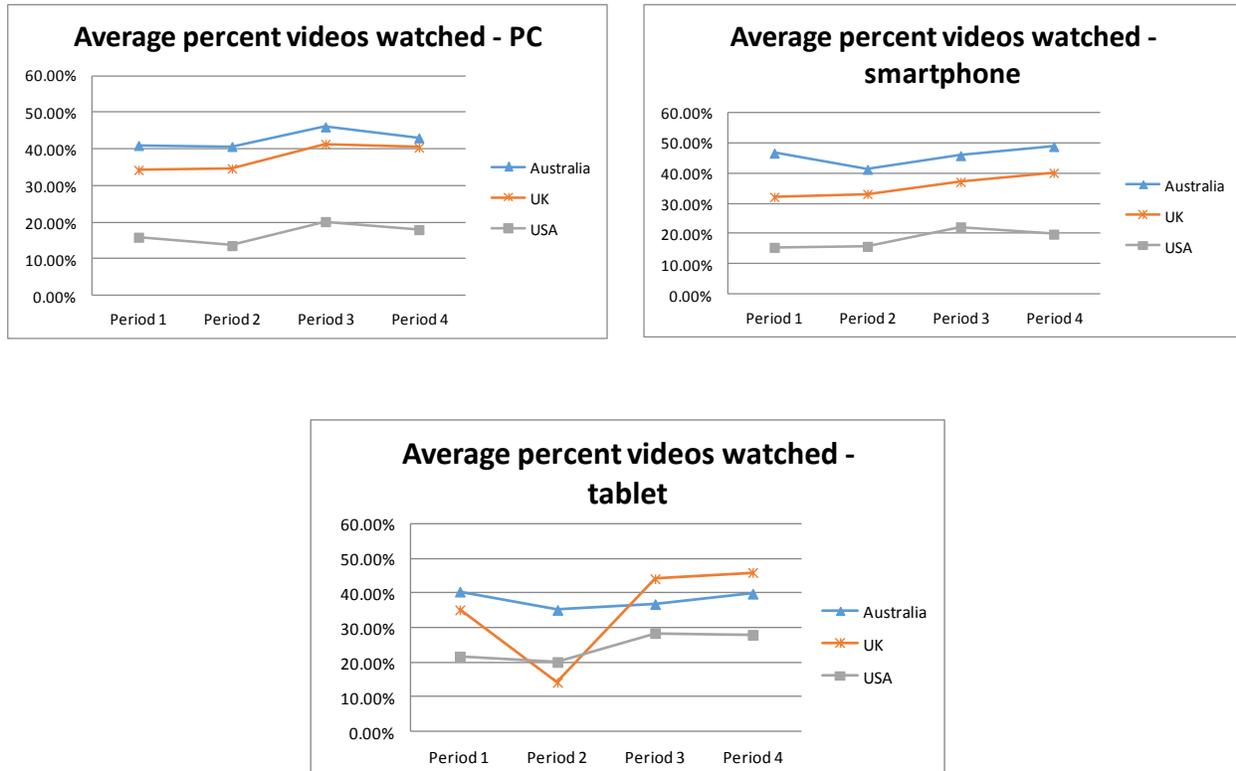
The differences in "% minutes watched" between devices, according to the period of the semester, for all countries are shown in Figure 2. It can be seen that students, in all countries watch most time of the videos on the PCs. Between the mobile devices, it can be seen that the Australian students watch more time on the smartphone, while the students in the UK and USA use the Smartphones and tablets in the same way.



**Figure 2: The percent of minutes watched on the devices, according to periods and countries**

**Av. time watched (min)** – There were no statistical differences found between the devices (PC - 3.36, smartphone – 3.64 and tablet – 4.02 minutes)

**Av. % videos watched** –There were statistical differences between countries watching over different devices. In PCs, as can be seen in Figure 3, the Australian and UK students watch a similar percent of videos, while the USA students watch less all over the semester. Similar results were found on smartphones. The % of videos watched over the tablets has a different behavior in the UK, as shown in Figure 3.



**Figure 3: The average percent of videos watched, according to periods and countries**

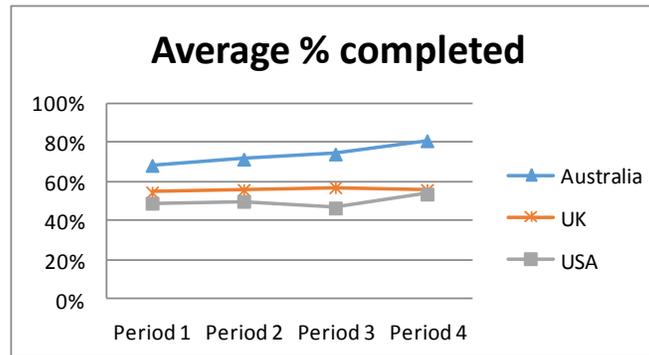
**Av. % completed** – There were no differences found between the devices in the different periods. Students complete more videos in Australia, using their PCs (74%) and smartphones (78%). No difference was found in the completion of watching the videos over the tablets, between the countries.

### Differences between periods, in overall devices

**Av. time watched (min)** - The students in Australia watched more time (4.13 min) than in the UK (2.70 min) and USA (3.27 min), which were similar. The same was found when examining all the four periods. No differences were found between the periods.

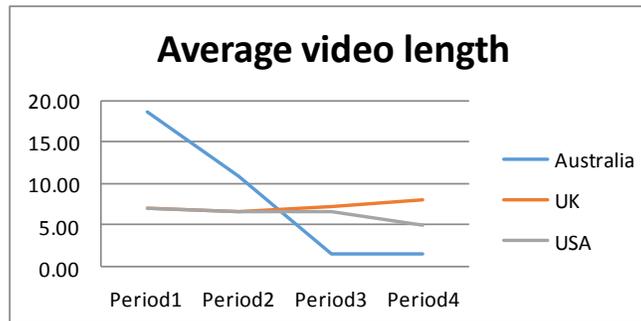
**Av. % videos watched** – As can be seen in Figure 3, all the counties have a similar U-shape graph, which indicates an inclination to procrastinate.

**Av. % completed** – As can be seen in Figure 4, during the semester the % of videos that the students watch without dropping-off increases. The Australian students tend to complete a larger amount of videos compared to students in the other two countries. Between the UK and USA there were no statistical differences.



**Figure 4: The average percent of videos completed according to periods and countries**

**Av. video length** – In the Australian institutes, the videos watched by the students at the beginning of the semester are significantly longer than those watched at the end of the semester, as shown in Figure 5. Between the UK and USA there were no statistical differences.



**Figure 5: The average watched video length, according to periods and countries**

## Discussion

This study examines the usage of online video lectures by students in Australia, United Kingdom and United States of America, in five large academic institutions of each country. The usage patterns are defined by the timing along the semester when the video lectures are consumed, the preference of students about the length of the videos, the rate of completion or drop-off before finishing the video, and the device used for watching the video (PC, tablet or smartphone).

### **The influence of the semester period on the usage pattern and watching completion –**

The U-shape curve pattern of usage can be observed (Fig. 3) in all countries, using any device, fitting the findings of different studies (Stewart, Stott, and Nuttall, 2011; Geri, Gafni, and Winer, 2014b).

Another interesting result, in all countries examined, is the mild increase of video watching completion towards the end of the semester (Fig. 4). The top increase of completion was found in the third period of the semester, which involves 30% increment in completion using tablets, 15% using smartphones and 5% using PCs. These increments change during the last period of the semester – 2.5% decrease using tablets, 6.5% decrease using smartphones, but 4% completion increase using PCs. These facts may show that, at the beginning of the semester the students are

ready to watch and complete the whole lectures, but, at the end of the semester they prefer focused lectures on specific subjects. These results fit the outcome of the research of HersHKovitz and Nachmias (2009), in which they found that, in the last month of the semester, on one hand, the average time for watching each video decline, but, on the other hand, the frequency of watching videos increase. The explanation can be that, in order to prepare themselves for the exams, after they have learned throughout the semester, they need only to skim the videos.

Thus, the H1 hypothesis was confirmed, the temporal patterns use of online video lectures are similar in Australia, UK and USA.

### **The influence of the video length on the usage pattern and watching completion –**

It can be seen that, no matter which device is used, the rate of video watching completion is greater when the video length is shorter. Moreover, the average continuous time of watching is short, about 4.2 minutes on a PC or smartphone, and about 5 minutes on a tablet. These facts fit with the characteristics of undergraduate students, which most of them obviously belong to the Y generation, whose ability for attention is constantly getting shorter (Shipper, 2013).

Although students watch shorter videos on PCs than on tablets, the completion rate is greater on PCs, especially in the first two periods of the semester. This can be explained with the fact that for using a PC there is a need for a table and a chair, while the mobile devices are used everywhere and anytime, so students may try to watch a video when they have a short break, while traveling or while eating. The ability to exploit effectively the time fits the Y generation (DiLullo, McGee and Kriebel, 2011), which was born into the technological era, and most of them combine work with studies, preferring mobile learning (Fricke and Agrawal, 2013).

The H2a hypothesis, claiming that students will prefer to watch short videos, and the H2b hypothesis, stating that the rate of completion will be higher when the video lessons are shorter, were both confirmed.

The H3a hypothesis claiming that the students will prefer to watch the video lessons in a comfortable and quiet environment, using a PC with a regular size screen, no matter the country they belong was confirmed.

### **The influence of the country on the usage pattern and watching completion –**

Some results were found, distinguishing the behavior of students and pattern usage of videos, of the three countries examined. One of the differences is the rate of completion, which is greater in Australia than in the UK or USA, for each one of the devices. A second difference was found in the average watching time (in minutes). While in the UK and USA the average watching time over a PC is 3 minutes, in Australia the students watch 6 minutes. There was also a similar difference when using a mobile device. It is difficult to explain these differences by the culture issues found which are minimal. Nevertheless, the motivation of Australian students to get ahead of others and be competitive (Richards & Bilgin, 2012), along with the fact they found the learning activity extremely worthwhile (Cseh, Kumar & Cavallaro, 2012) can be an explanation.

The difference in the usage through mobile devices can be explained according the adoption of these devices in the different countries, 61% of the Australian students have a smartphone, 61% of the Americans' students, and only 56% of the Britain students (Park, 2011). In Australia, about 24% of the watching time were performed using mobile devices, while 22% in the USA and 18%

in the UK. There is also a possibility that the differences derive from unlikeness in the character of the videos the faculty prepare, which can not be defined in this research.

The H3b hypothesis stating that because the penetration of the technologies is very similar between the countries, there will not be differences in the devices used by the students was not confirmed. Although the differences between the countries are not large, there were found some differences.

The results indicate that most of the students still prefer the use of PCs, while there is a comparatively low usage of smartphones and tablets for viewing video lectures. The mobile devices are relatively new technologies, with lower penetration than the familiar PC. Maybe the “innovators” and “early adopters” (Rogers, 2003) among the students are already using handheld mobile access to video for learning.

### **Practical Implications**

The practical implications of this study are relevant to the faculty and instructors preparing the videos, who must try to shorten each video to a maximum of five minutes. During the first period of the semester, the instructors can prepare longer videos, explaining and detailing each subject. During this part of the semester, the students need to learn the basics in each course. If the videos are short the probability that the students will watch the video without dropping out till their end is very high. During the third period of the semester, and during the exam preparation period, it seems that the students want to get short and focused videos, each containing explanations of only one subject, summarizing the learning materials, so the students can choose to watch the specific explanations they need.

The video lectures, especially the short and focused ones, must be adapted to the screen size of the mobile devices, so the students can maximize the exploitation of their scarce time, and watch the videos anywhere and anytime.

Moreover, another way to increase students' motivation to watch the videos till their end can be by combining interaction into the videos, applying the benefits and characteristics of the mobile devices and technology, enhancing m-learning (Cherrett, Wills, Price, Maynard & Dror, 2009; Dror, Schmidt & O'connor, 2011) and improving its effectiveness (Zhang, Zhou, Briggs, & Nunamaker, 2006).

### **Limitations and Further Research**

This study was performed during the period of one academic year. In this short period there is no possibility to see if there are changes over time, especially those deriving from the adoption of new technologies. Further research needs to collect information during a larger period.

The data were accumulated from only 15 academic institutes, using the same company infrastructure, most of them "first class" universities, who invest a large allotment of money in the video infrastructure. Further research must be performed in order to get information from varied institutions, and maybe expanding the research to more countries. In this way more cultural issues may be found between different countries, for example, comparing Asian and Western countries or developed and under-developed countries.

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## Conclusion

From this research it can be seen that, in an overall view, there are no significant differences between students in the three examined countries, regarding the usage patterns of watching video lectures. The U-shape pattern, demonstrating procrastination, can be found in the three countries, proving that procrastination is universal, as shown in meta-analyses of prior studies (Steel, 2007).

Moreover, the drop-off when watching the videos exist everywhere, and also the preference to use the PC instead of the mobile devices. The differences found are minimal.

Nowadays, when more and more academic institutes introduce e-learning classes which include video lectures, as part of blended or online courses, as well as open life-long-learning initiatives, such as MOOCs, there is a need to adapt the video lectures to the student's preferences. These adaptations, based on short and focused videos, adjustments to different sizes of devices, and assignments based on the videos during the semester, will increase students' motivation to watch and complete seeing the videos till their end, in a timely manner.

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