Understanding mobile VLE usage in distance education: A pilot study

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Understanding Mobile VLE usage in distance education: A pilot study

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Abstract: This paper presents preliminary results of a mobile virtual learning environment (VLE) usage study conducted at a United Kingdom (UK) distance education institution. A total of 207 undergraduate students participated in the study over a period of 6 months. Study participants were recruited through email invitation. An online survey was conducted to gather both quantitative and qualitative data about (i) learner characteristics, (ii) awareness about the existence of the system, (iii) perceptions about the usefulness of the system to support learning, (iv) attitudes towards using mobile VLE to support learning, and (v) motives for using the system. Results indicate that perceived usefulness of the system and also familiarity with its usage in teaching and learning affects deployment in distance education. These findings confirm our assumptions that the design and integration of mobile VLE in teaching and learning should be closely aligned with pedagogical goals and established practices.

Introduction

The use of Virtual Learning Environments (VLE) to support teaching and learning in higher education has moved from a position of peripheral interest to becoming a principal means by which institutions are managing and delivering learning (Browne et al., 2006; Weller, 2007). Key to this development is the VLE's capacity to host a variety of technological tools and learning materials into a single integrated system for supporting teaching and learning, managing and distributing learning resources. Teaching and learning activities that are commonly supported by VLE systems include assessments and learner interactivity e.g. through the use of online discussion forums and web conferencing. VLE systems are also commonly used to deliver content whilst incorporated technological tools are used to support collaborative and communication activities between learners and their tutors (Weller, 2007). In this regard, VLE systems are particularly important for supporting distance education due to the fact that face-to-face interactions between learners and tutors are limited or non existent.

Given the prevalence of VLE in higher education (Browne et al., 2006; Weller, 2007), it is not surprising that we are currently witnessing an increase in the combined use of VLE and mobile technologies into what has become known as 'mobile VLE' or 'mobile Moodle' (Adams et al., 2009; Avey, 2011; Chen et al., 2008; Thomas, 2012; Sampson, et al., 2008; Sulcic, 2010; Unal, et al., 2012). Mobile VLE presents an ideal environment for supporting and nurturing personalised learning whilst providing increased flexibility in the ways that learners access and work with online educational resources, and also in how they interact with one another. The idea of enhancing flexibility and personalised learning is particularly important in distance education due to the fact that learners are separated from their peers and tutors (Richards & Roe, 1994). Mobile VLEs can therefore, enable distance learners to become autonomous learners by allowing them to take control of their own learning and engage in more personally meaningful activities (Moore & Kearsley 1996). Distance learners can use mobile devices to access VLE based learning materials anytime anywhere, identify their own learning needs and solutions with or without the support of a tutor and peers. For example, learners can use mobile tags such as QR Codes to reveal useful information about physical objects during museum visits and share that knowledge with their peers in VLE based online discussion forums, video conferencing systems or blogs, etc (Sulcic, 2010; Offir et al., 2008; Linn, 1996).

The vision to empower learners to champion their own learning by using mobile technologies to access and interact with peers and VLE based educational resources is having a significant impact on learning in higher education (Ballard & Butler, 2011). However, little is known about the extent to which learners actually use mobile VLE tools to support learning. Such insight is vital to enable educational system developers and policy makers to design and implement learning environments that learners actually use and that effectively support learning. Furthermore, Fry et al (2003) observed that the introduction of new technology into teaching and learning cannot replace established methods due to the fact that there are

several factors that influence technology use. These include pedagogical goals; social, cultural, psychological and human computer interaction (HCI) usability aspects (see also Blin & Munro, 2008). As a result, technology deployment in human activities has been investigated by several researchers including Kaptelinin & Nardi (2006), who emphasize the activity theory (Leont'ev, 1978), based view that technological tools are culture specific tools that shape the way people act and develop. Kaptelinin explains that technological tools incorporate cultural knowledge and social experiences that shape the way people use them when carrying out activities (Kaptelinin & Nardi 2006). In order to address these issues in relation to mobile VLE usage in distance education, we designed a pilot study to investigate current practices, attitudes and perceptions.

The Study and Research Context

The Open University in the UK (UKOU) is a world leader in distance education provision and online learning; it is at the forefront of using innovative technologies to support teaching and learning. Two years ago, the UKOU commissioned the development of a mobile VLE system (see Figure 1) to run in parallel with web-based Moodle virtual learning environments. The aim was to enhance learner flexibility in accessing and interacting with educational resources by optimising learner support for accessing and working with VLE-based learning materials and technological tools using the mobile VLE system. Human Computer-Interaction (HCI) usability aspects of the design of the mobile VLE system were conducted throughout the systems development and implementation process (Thomas, 2012). However, no specific study was carried out around pedagogical aspects of systems deployment in order to understand how and why it is actually used in teaching and learning activities, nor to determine the effectiveness of using the system to support learning. The original driver for the mobile VLE project was to support learners in 'keeping on top of their studies', therefore, the system was constructed primarily for personal use.
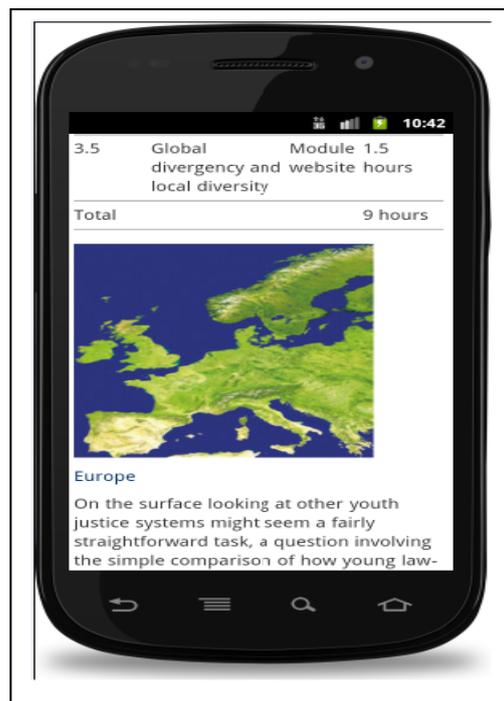
Figure 1: The UKOU mobile VLE showing environmental science learning materials on a handheld device

The purpose of this study was to establish the current state of mobile VLE usage amongst UKOU students so as to determine the usefulness of the system in supporting teaching and learning. A key focus of the study was to identify issues and usage patterns or practices that promote or prevent effective use of the system in teaching and learning. In order to draw both pedagogical and social-cultural insights around mobile VLE usage, we investigated learners' current practices, attitudes and perceptions of using the mobile VLE to support learning by examining issues relating to: mobile device ownership and usage

patterns, awareness about the existence of the UKOU mobile VLE system, attitudes and perceptions of using mobile VLE tools and learning materials, familiarity and experience of using mobile VLE to support learning, locations in which learners access and use mobile VLE, also general issues that affect its usage when carrying out learning activities. Methods used to investigate these issues are discussed as follows.

Research Methods

A six month pilot study involving an online survey with UKOU students was designed to facilitate investigations into mobile VLE usage to support learning. A total of 207 students were recruited from the faculties of Arts and Science. Detailed discussions about methods used to design and implement the survey, description of study participants, data collection, data analysis and interpretation of findings are as follows.

Research Questions

The study was focused on addressing this main research question: How do UKOU students use the mobile VLE system to support learning? The study specifically worked through the following sub-research questions.

1. What type of mobile device(s) do you own?
2. Are you aware that you can access your module website and work with learning materials using a mobile device such as an iPhone, iPad, etc?
3. Would you like to find out how you can use a mobile device to access and work with learning materials available on your module website?
4. Do you use your mobile device(s) to access and work with learning materials available on your module website?
5. In what sort of activities do you use your mobile device(s)?
6. How often do you use your mobile device(s) to support learning activities?
7. In what locations do you, or would you, normally use your mobile device(s) to access and work with learning materials available on your module website?
8. In your opinion, which of the following (if any) influence the way that you use your mobile device(s) to access and work with learning materials and tools available on your module website?
9. Would you be willing to take part in a 30 minute follow-up interview (e.g. face-to-face, over the telephone or internet e.g. using Skype) about using mobile devices to access and work with learning materials and tools available on your module website?

Study participants

Study participants were UKOU students registered for various undergraduate and postgraduate modules in the faculties of Arts and Science. From an initial sample of 2,000 students, 207 responded to an email invitation to participate in the study. Participants included male and female students between the age of 21 and 65. All participants were distance education students experienced in using mobile technologies and the OU learning systems, underpinned by a Moodle VLE, to access and work with learning materials and to communicate with peers online. In order to obtain a balanced view of mobile VLE usage practices across subject areas and levels of study. All module materials were available on the Moodle based VLE system. Participants were already familiar with working with VLE based learning materials and tools such as discussion forums. In order to ensure that we obtained informed consent, participants were advised about their ethical rights (e.g. informed consent, confidentiality, right to withdraw, anonymity, data protection), in non-technical language and were given full information about the project before being invited to sign a consent form. Participants were assured that their participation in the project would not be linked to the assessment of their learning on the module.

Data Collection

There were two phases of data collection: the first phase was implemented through an online survey. The second phase involves follow-up interviews with students (via telephone and internet-based communication systems such as Skype and Elluminate). Interviews are still ongoing at the time of writing this paper. Therefore, in this paper, we rely on data from online survey.

Both qualitative data and quantitative data were collected, that explored:

- learner characteristics, such as, mobile device ownership, experience in using mobile devices to work with VLE-based learning materials, location of mobile VLE usage;
- awareness about the existence of the mobile VLE system;
- Attitude and perceptions relating to the usefulness of using the mobile VLE system to support learning.

In order to gather data that was suitable for our targeted outcomes, the questions were designed using a Likert scale, with response positioning of various rankings. The design of the questionnaire was reviewed by our institution's Survey Office and Data Protection Officer, both of whom made suggestions for improving questionnaire items. The questions were revised accordingly. Data was collected between July 2012 and November 2012. In total, 207 survey responses were returned, giving us an overall response rate of 10.4%. Each completed questionnaire was analysed for completeness and consistency before being transferred for computer analysis. All data transfer was verified by the research team members.

Data Analysis

Mixed methods involving both quantitative and qualitative techniques for analysing research data were applied. The Nvivo statistical package was used to organise and analyse data in preparation for interpretation and dissemination. We statistically analysed responses to the nine questions outlined above, calculating the percentage of each response in relation to learner demographics such as gender and subject area. The aim was to determine the extent to which students' use of the mobile VLE system varied by pertinent characteristics. In addition, statistical comparison of Arts and Science students' use of the mobile VLE and opinions were conducted to verify differences between the two subject groups. In order to maintain confidentiality, all findings are reported anonymously.

# Findings and discussions

Question 1: Device ownership

We established that the majority of students who participated in this survey owned a mobile device and, in some cases, they owned more than one type of mobile device or handheld device. The most popular mobile device was a Laptop Computer, with a combined Arts and Science overall ownership at 82%. However, a higher proportion (94%) of Science students owned a Laptop Computer than Arts students (80%). The second most popular device is a mobile phone (excluding iPhone, Android and Blackberry smartphones) with 36% of students overall indicating that they own such a device. In this case, a higher proportion of Arts students (40%) owned such a mobile phone, compared with 31% of Science students. Smartphone ownership was as follows: iPhone (Arts = 20%, Science = 41%), Android smartphone, (Arts = 23%, Science = 24%), Blackberry (Arts =12%, Science = 6%). Other devices that students owned include: iPad (Arts = 28%, Science = 27%), iPod Touch (Arts = 11%, Science = 10%), eBook Reader (Arts = 40%, Science = 24%). A small number of students indicated ownership of other handheld devices (Arts = 4%, Science = 4%), while about 1% indicated that they did not own any mobile device. Figure 2 presents a graphical illustration of device ownership by gender, faculty and combined.
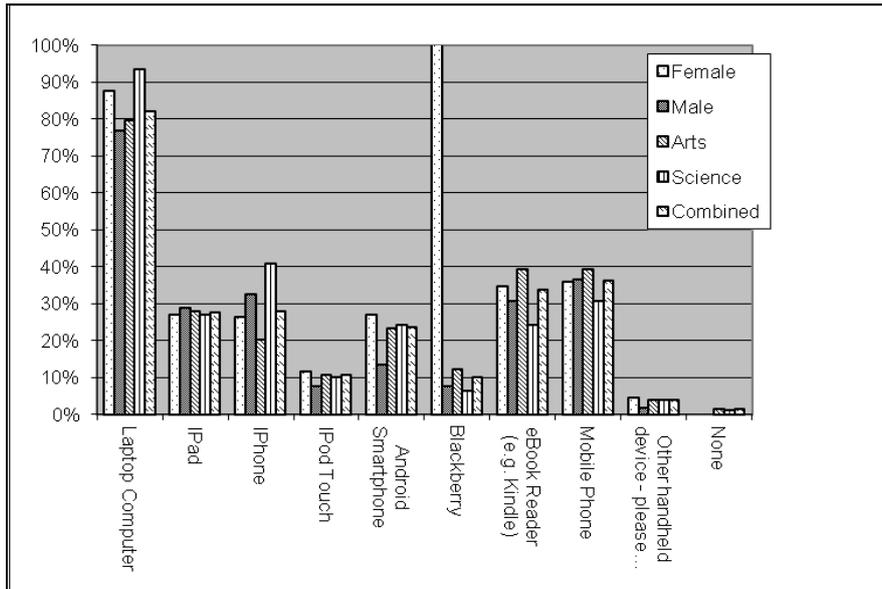
Figure 2: Device Ownership between Arts and Science students

Question 2: Awareness of the existence of the mobile VLE system

When asked whether or not they were aware that they could use their mobile devices to access and work with learning materials available on their module website, only 65% of students overall indicated that they already knew about the existence of the mobile VLE system. However, 35% of the students surveyed reported that they were not aware of the existence of the mobile VLE system. When we examined the data further, we learnt that at 67%, more Arts students know about the existence of the mobile VLE system than Science students whose awareness percentage was on 63%. However, 33% of Arts students and 37% of the Science students reported that they were not aware of the mobile VLE system. Figure 3 presents these findings.
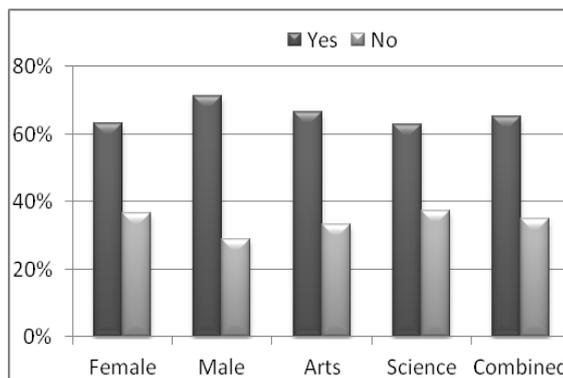
**Figure 3:** Awareness of the existence of the mobile VLE system

Question 3: Willingness to find out more about the mobile VLE system

When asked whether or not they would like to find out more about how they could use the mobile VLE to support their learning activities, 50% of the total respondents indicated that they would be interested, whilst the other half (i.e. 50%) declined. Further analysis of results show that 51% of Arts students and 48% of Science students surveyed are interested in finding out how they can use the mobile VLE system to support their studies. On the negative, 49% of Arts students and 52% of Science students indicated that they were not interested in finding out more about how to use the mobile VLE systems to support their studies. Once more, the data clearly shows that whilst more students in the Faculty of Arts

showed interest in finding out about the mobile VLE, when compared to the 'Yes' percentage of Science students Furthermore, a higher percentage of Science students also declined to find out more about the mobile VLE system.

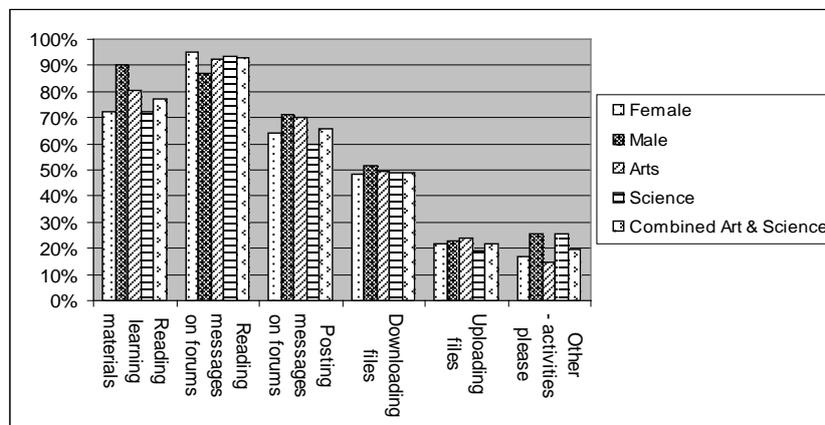**Question 4: Mobile VLE usage in learning activities**

Students were asked whether or not they used their mobile devices to access and work with learning materials. Overall, 58% of respondents reported that they had used the mobile VLE system, whilst 42% of the students said that they did use the system. When we analyse this data by faculty, 56% are Arts students and 62% are Science students. In the meanwhile, 44% of Arts students and 38% of Science students said that they did not use the system. Analysis of this data by gender indicates that 55% of females and 69% of males use the system. However, 45% of females and 31% of males do not use the system. Figure 4 shows these results.
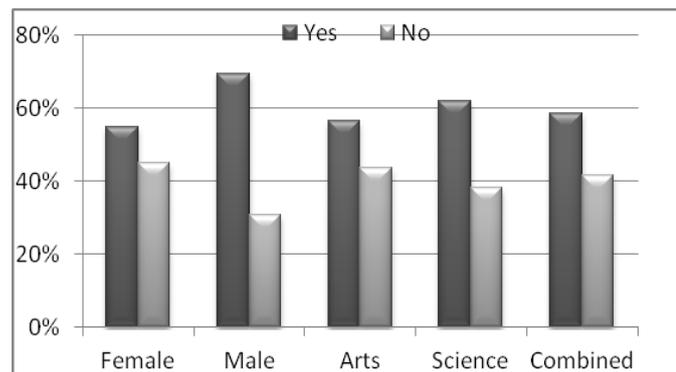
Figure 4: Mobile VLE usage in learning activities

Question 5: Activities in which students use the mobile VLE system

Part of our inquiry was to understand the type of activities for which students use the mobile VLE system. The data show that students in both faculties use mobile devices to: read learning materials (77%), read messages on the forums (93%), post messages on forums (66%), download files (49%), upload files (22%) and for other activities (19%). These results indicate that the most popular activity for mobile VLE usage is reading messages on discussion forums, with Science students at 93% leading in usage, the usage percentage for Arts is 94%. Results also show that the percentage of male students using the mobile VLE system is higher than that of female students across all activities, except reading messages on forums. These findings are illustrated in Figure 5.

Figure 5: Activities in which students used the mobile VLE system

Question 6: Frequency of use

Part of our investigation was focused on understanding how often students used the mobile VLE system to support their learning activities. Results indicate that 39% of the respondents used the mobile VLE system 'a few times a week', followed by 32% who used the system 'every day'. 17% of the respondents used the mobile VLE system 'once a week', while 9% use it 'once a month' and 4% use it 'less frequently'. Looking at the data about frequency of use by gender, we could see that 42% of males use the system a few times a week compared to females at 37%. Meanwhile, when we analysed the student data about frequency of use by subject category, we learnt that 43% of Arts students used the system a few times a week whilst only 32% of Science students reported the same. Meanwhile, there is no major gender and subject difference in the analysis of every day usage of the system (females = 31%, males = 32%, Arts = 33%, Science = 32%). Figure 6 illustrates these findings.
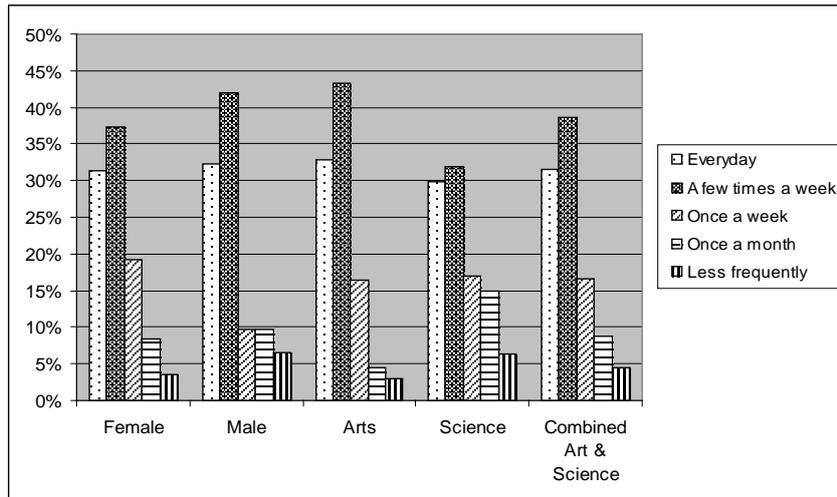

Figure 6: Frequency of use

Question 7: Context of use

Our study was also interested in establishing the context or locations in which students used the mobile VLE system. Results indicate that students used the mobile VLE system in various locations including: anywhere (50%), around the Open University premises e.g. Walton Hall Campus (6%), at home e.g. in the UK (75%), at their workplace (38%), whilst abroad e.g. outside the UK (31%), on public transport (42%), also in public places with free wifi (53%), and in other locations not listed (12%). These findings clearly show that a large number of students use the mobile VLE system whilst at home. Results also show that more females (41%) used the mobile VLE system at home than males (34%). This is followed by almost half the students reporting that they use the mobile VLE system in public places with free wifi. In this case, more males (38%) used the mobile VLE in public places with free wifi than female students (15%). When we analyse this data by faculty, results show that 82% of Arts students and 66% of Science students use the system at home. Again, 51% of Arts students reported that they use the system in public places with free wifi compared to 55% in Science who indicated the same. These results are presented in Figure 7.
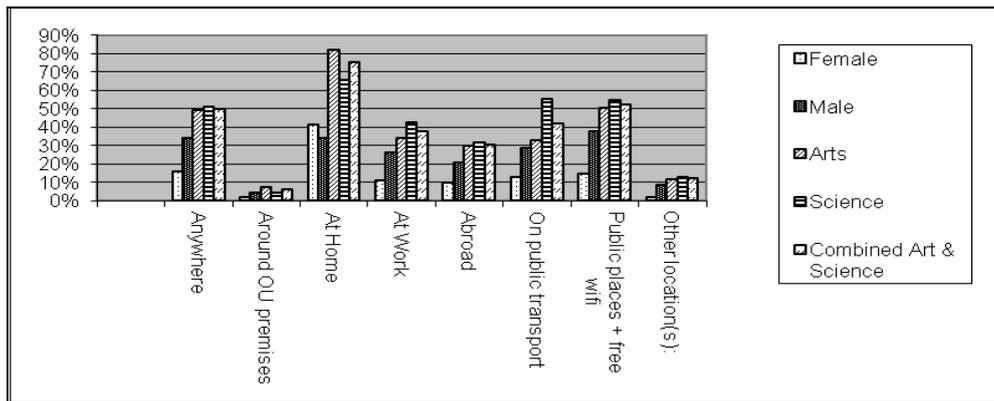
Figure 7: Location of mobile VLE use

Question 8: Motive for using the mobile VLE system

When we asked students to comment on issues that determine whether or not they use the mobile VLE system and influence the way that they use the system, 55% of students who were surveyed reported assignment submission deadlines, followed by 50% of the students mentioning the module guide, and 43% reporting collaborating with other learners. Meanwhile, 36% of the students named the module pre-requisite requirements and assessment criteria as factors that affect their motive to use the system. These statistics are closely followed by 32% of the students who indicated that working in team influenced their mobile VLE usage whilst a fairly small number of students (11%) reported that other reasons motivated them to use the system. Analysis of this data by faculty indicated that 57% of Arts students were largely influenced by assignment submission deadlines compared to 52% of the Science students who said the same. When we analysed this data by gender, female students indicated that they were influenced by assessment criteria (33%), module guide (45%) and collaborating with other learners (45%). Statistics for male students who reported influence in these areas are: 45%, 61% and 39% respectively. Female students in both faculties consider the rules and regulations around the module as an important factor in deciding whether or not to use the mobile VLE system. These findings clearly show that various issues influence student use of the mobile VLE system in learning. See Figure 8 for a graphical illustration of results.
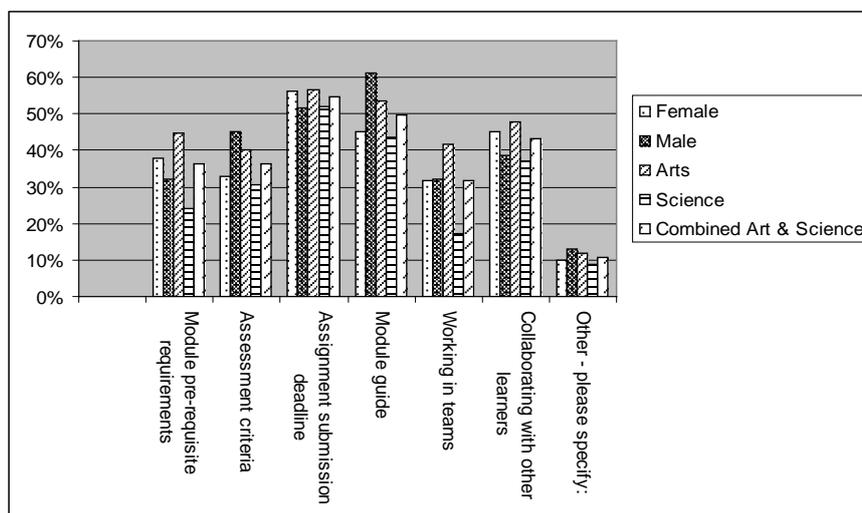
Figure 8: Motive for using the mobile VLE system

Question 9: Invitation to participate in a follow-up discussion

Finally, we asked students to indicate whether or not they would be interested in participating in a follow-up discussion about using the mobile VLE system to support learning. Results show that most of the students (62%) are willing to participate in a follow-up interview about the mobile VLE system. However, 38% of the students declined this invitation. Analysis of this data by faculty indicates that Arts students

(41%) are willing to participate in follow-up discussions than Science students (28%). However, a fairly large number of Arts students at 25% rejected our invitation. In Science, 17% of the students refused to participate in follow-up discussions about using the mobile VLE system to support learning.

Conclusion

Evidence from the data collected shows that study participants had a positive attitude towards using mobile VLE to support learning activities. However, the lack of constructed activities to link mobile VLE usage to pedagogical aspects of the module being studied is hampering progress in mobile VLE usage and integration in learning. For example, the overall analysis of usage statistics as outlined in findings relating to question 5, on the types of activity undertaken, indicate that both Arts and Science students do use mobile VLE tools but that it is still peripheral to core learning activity. There is scope to add more mobile-oriented opportunity into the learning design, and appropriate publicity, combined with the frequent access observed could lead to rapid uptake of new approaches. Meanwhile, device ownership does not appear to be a major factor since only 1% of the surveyed students reported that they did not own a mobile device (see Figure 2). Study results clearly show that the majority of the students are aware of the availability of the mobile VLE system for supporting learning (see Figure 3). Furthermore, study findings have shed light on learner opinions and perceptions about using the mobile VLE system to support learning. However, further studies are required to understand usage practices, social-cultural and contextual issues that affect mobile VLE usage amongst students. For example, students reported that they use mobile devices and the internet in various locations (as evidenced in Figure 7). In future work, it is important to note that a large proportion of mobile access is now actually in the home, and that students do make use of WiFi hotspots as well as mobile internet connectivity.

However, module-related rules and regulations such as deadlines, assessment criteria, and practices such as collaborating or working in teams (see Figure 8) appear to influence whether or not students use the mobile VLE system. There are several ways to interpret this observation: First, reasons for not using the mobile VLE tools can be attributed to lack of familiarity with advanced functionalities of the system. Second, half of the students who were surveyed expressed interest in finding out more about how they can use the mobile VLE system to support learning (as evidenced in Question 3). This implies that lack of experience in using mobile VLE tools to support learning reduces the perceived need to use the system. Consequently, students are avoiding using the system altogether. These findings highlight the need for introducing formal training in using mobile VLE to support learning, which can be implemented through the use of working examples incorporating usage scenarios for learning support. To achieve this, a long term study of learner practices is required understand the development of practices over a period of time and to identify usage patterns and critical incidents that are crucial to mobile VLE uptake.

This study enabled us to gain some preliminary insights into student views and perceptions about using the mobile VLE system to support learning. Findings point to the need for a closer look of usage practices by analyzing the nature of activities carried out using mobile VLE tools and examine objects created to get an idea of purposes of use and determine whether or not mobile VLE tools are being used to enhance deep learning or to simply replicate what can already be done by other means. These findings have significant implications for educational technology design and educational policy due to the fact that they raise awareness of the importance of social-cultural and pedagogical aspects of technology use in teaching and learning. The mobile VLE project is currently exploring these issues through follow-up interviews and online observations of mobile VLE usage.

Limitations of Study

Our study results revealed significant findings and identified important implications for educational technology design and policy, however, the study has several limitations that require further research. The first limitation is that being a distance education institution, the research sample was drawn from distance educations students which meant that methods for gathering research data were limited to what can be implemented online. We therefore, could not conduct observational studies in the traditional face-to-face arrangement. Second, the mobile aspect of mobile VLE usage patterns imply that it was not possible to analyse practices in the context of use since students use mobile VLE tools in various locations and different times. Finally, the Open University is the largest higher education institution in the UK, which means that the student population is also very high, therefore, our study only examined a very small aspect of the student population. Future research should consider working with larger samples over a period of time to understand and compare factors that influence student use of mobile VLE systems in distance education.

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