Context in Mobile learning: the point of view of the learners

Khamssa CHOUCHANE[a,b,1], Almaas ALI[b], Juan Carlos AUGUSTO[b], Okba KAZAR[a],
[a] *LINFI Laboratory, Department of Computer Science, University of Mohamed Khider Biskra, Algeria*
[b] *Research Group of Development of Intelligent Environments, Department of Computer Science, Middlesex University London, UK*

Abstract. Context-awareness is becoming a crucial component in the mobile learning systems due to the dynamic changing of the Mobile learning environment, a Context-aware mobile learning system senses mobile environment and reacts to changing context during the learning process. Some efforts have been made in the area of Context-aware Mobile learning systems in order to propose a user model, most of them are focusing on the technological context such as the network performances, mobile devices capabilities, others are focusing on the learners' style and preferences, and no one tried to understand the learners' needs. However, no one tried to study the Learning context from the point of view of the learners. For this purpose, we created a questionnaire, in which we tried to understand which learning contexts are important to the learners in the learning process, and we use it to understand their needs and preferences, to inform the design of a new Context aware Mobile Learning Approach.

Keywords. Mobile Learning, Mobile Devices, Context-awareness, Learning Context.

1. Introduction

Advances in wireless networking and mobile broadband Internet access technologies, the maturing of portable mobile devices as well as the rapid development of ubiquitous computing and pervasive computing mean people today are no longer limited to certain environments in their lives or education [1]. Mobile learning can be defined as the use of hand-small and portable wireless devices such as mobile phones, personal digital assistants PDAs, smart phones and smart phones, personal computers and small tablet PCs, to achieve the flexibility and interactivity [2]. Context-awareness has becoming a crucial component in the mobile learning systems due to the dynamic changing of the Mobile learning environment, a Context-aware mobile learning system senses mobile environment and reacts to changing context during the learning process. There have been several studies in the literature in the area of Context-aware Mobile learning systems; most of them are focusing on the technological context such as the network performances, mobile devices capabilities.

[1] Corresponding Author, Research Group of Development of Intelligent Environments, Department of Computer Science, Middlesex University London UK; E-mail: K.Chouchane@mdx.ac.uk

In this paper, we provide a questionnaire, in which we tried to understand which learning contexts are important to the learners in the learning process, and we aim to understand their needs and preferences, to use this information in our new Context aware Mobile Learning Approach. The remainder of this paper is organised as follows. First, we present an overview of context-awareness in mobile learning. Second, we will explain our methodology and our work. Third, we describe in detail our questionnaire. After that, we will discuss the results of this questionnaire. Finally, our conclusion and future work is given.

2. Context awareness in mobile learning

The most used definition of context in literature is defined by Dey [3]: ''any information that can be used to characterise the situation of an entity'', where an entity is can be a person, place, or physical or computational object. However that definition is too technology centric and we favour instead the following user-centric revised definitions as we want to emphasise the importance of the stakeholders in technology:

Contexts: "*the information which is directly relevant to characterise a situation of interest to the stakeholders of a system"*.

Context-awareness: *"the ability of a system to use contextual information in order to tailor its services so that they are more useful to the stakeholders because they directly relate to their preferences and needs"*.

Context-awareness is an essential component of systems developed in areas like Intelligent Environments, Pervasive & Ubiquitous Computing and Ambient Intelligence [4]. Thus, context is an important explanatory concept in mobile learning. If we see learning as a mobile activity that can occur anywhere, supported by a wide variety of physical, technical and social resources, with or without a teacher, then understanding the ever-changing context of learning becomes a central concern. [5] Therefore, the awareness of learning context is important. A learning system that examines the learning context shall adapt learning process with respect to context change. Although it is not a new idea, context awareness is increasingly vital in mobile learning because educational contexts are becoming more dynamic and complex. However, context awareness is not easy to achieve. Hence we are trying to facilitate understanding of the role of context in Mobile Learning, to identify which contexts are more relevant to the learners.

3. Methodology

The aim of our work is to propose a context-aware architecture for mobile learning. Many efforts have been made in the area of Context-aware Mobile learning systems in order to propose a user model, most of them are focusing on the technological context such as the network performances, mobile devices capabilities .., others are focusing on the learners' style and preferences, and no one tried to understand the learners' needs and no one tried to study the Learning context in the point of view of the learners.
In this questionnaire we tried to understand which learning contexts are important to the learning process, from the point of view of the learners and to understand their needs and

preferences, to use this information in our new Context aware Mobile Learning Approach. We have created an online questionnaire using Google forms, and we sent the link to the participants using email, the 64 participants are students of January and October Start international foundation year, Department of Computer Science, Faculty of Computer Science, Middlesex University.

4. Understanding Students Preferences on Contexts within Mobile Learning

In this section we will view on details our questionnaire, in which we asked the participants nine questions in order to understand student's preferences on contexts within Mobile Learning. In this section we will also discuss the results of this questionnaire.

Question 1: Have you ever used mobile devices for learning?

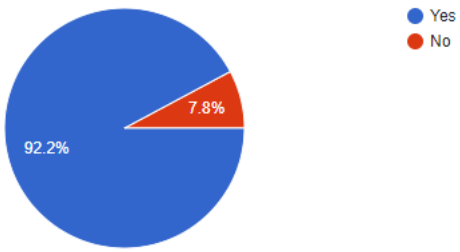

Figure 1. The use of mobile devices for learning by the students

Mobile devices are recognised as an emerging technology to facilitate teaching and learning strategies that exploit individual learners' context. This has led to an increased interest on context-aware adaptive and personalised mobile learning systems aiming to provide learning experiences delivered via mobile devices and tailored to learner's personal characteristics and situation [6]

From the chart, it can be seen that 92.2 % of the students have already used mobile devices to aid learning. The students use their mobile devices not only in the M-learning apps, but also to check digital dictionary, to record lectures. As well as taking of the whiteboard so that they can later access the photo, annotating PDFs and other activities. Meanwhile, 7.8 % of students have never used mobile devices in the learning process; they don't use their mobile devices for reading content because of the cons when it comes to using the phone, such the increase of strain with the eyes etc.

Question2: Do you prefer to study at home/class?

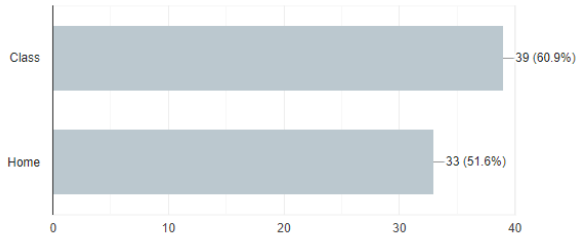

Figure 2. The favorite place of students to study (home or classroom)

This question was a multiple choice question, 48.4 % of the students prefer to learn at the class room, 39.1 % of them prefer to learn at home, and the remaining 12.5 % prefer to learn at class and home. Those who prefer to learn at the classroom agree that it's easier to concentrate at the classroom and there is less distraction, also they could not focus and they get lazy at home, others state that have an opportunity to ask the teacher questions, they can focus more in a class, where as others prefer to learn with their classmates rather than on their own and as they enjoy sharing ideas with them and at the same time they can help them, others prefer to learn at the class because they get more motivated and forced at the classroom.

Those who prefer to learn at home, state that it was due to the less distractions and more calm and quiet and more freedom. Also they see that It's more comfortable to learn at home than at classroom, and they can concentrate well, some of them see that they can save time for travel and easier to focus on learning and they can manage their time. Those who prefer to learn both at home and class, state they want to take benefits of the both because in class they have teachers to help them with anything they need, and at home because they can study from the comfort of their home, and there is a more quiet environment and time to relax, to relieve stress whilst studying.

Question 3: Do you prefer to collaborate and to communicate with the other learners during the Mobile Learning process?

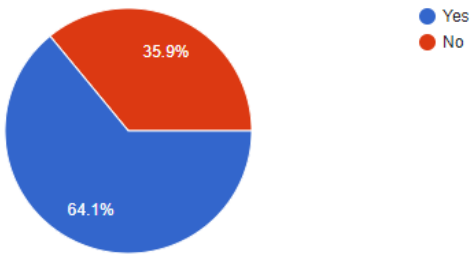

Figure 3 Do the students prefer to collaborate and to communicate with each other?

Collaborative learning encourages students to create groups and work together to solve a given problem. There are several benefits to the learners when working in a group setting: These include developing social skills, learn from peers, building trust, engaging in learning and gaining confidence.

A majority of students, 64.1 %, prefer to communicate and to collaborate with the other learners during the Mobile learning process, because they feel like they learn better with someone else rather than on their own and enjoy sharing ideas and hearing others. However, 35.9 % of them do not prefer to communicate with the other learners during because some of them work on their own better then working on groups.

Question 4: During the mobile technology facilitated learning, which communication technology do you prefer to use to communicate with them?

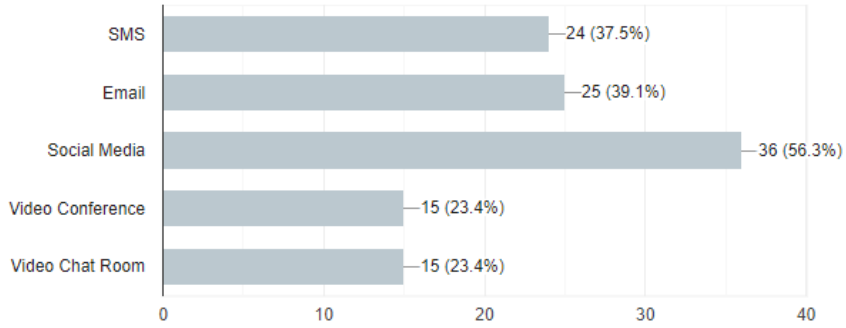

Figure 4. The favorite communication technology for students

The results reveal that the students prefer to communicate with the other learners via the social media (56.3%) such as Facebook, Twitter, Google Plus, and Flickr, students can communicate with their classmates and potentially with others outside the class such as students of the same topic and subject experts. Also they prefer to communicate with each other via email (39.1%) because it's fast, efficient, inexpensive and professional. They also state that would rather to use SMS (37.5%) as a communication tool especially when there is no internet connection. Finally the percentage of using video conference and video chat room is 23.4%.

Question 5: What do you think about using your personal preferences to personalise the learning content?

When it comes to learning, we all have preferences that are influenced by the ways in which we think - our personalities, our backgrounds and our culture. Scientists and psychologists have developed a number of different models for the learning style theory. One popular theory is, the VARK model [7], which identifies learners as four primary types: Visual, Auditory, Reading/Writing Preference and Kinesthetic

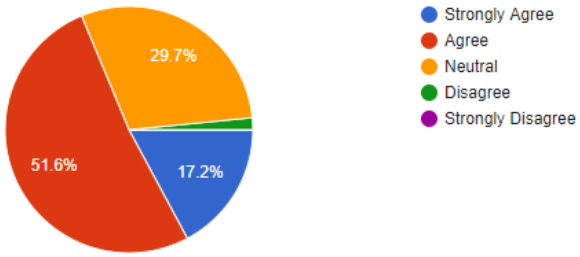

Figure 5. Students' opinion about the use of their personal preferences to personalise learning content

As shown in Figure 5; 15.9 % of students are strongly agree, and 52.4 % of them are agree to use the personal preferences to adapt the learning content because they know that learning styles and preferences can help them to learn best in their context, and are useful in raising awareness about this, a student may prefer to work alone at home, and do her assignments late in the evening when the family has gone to bed. Another student may thrive in group situations and only wish to study during the day on-campus. In the other side, 30.2 % of students respond with neutral and only 1.5 % of them are disagrees.

Question 6: Do you prefer that the learning content will be adapted according to the mobile device capabilities?

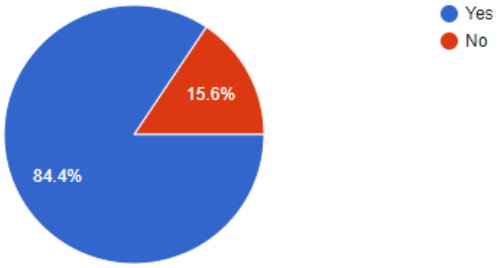

Figure 6. Students' opinion about the use of the mobile capabilities to personalise learning content

It was found that 84.4 % of students prefer that the learning content will be adapted according to the mobile device capabilities because of the portability of the mobile devices, which allow them to learn anywhere at home, in the bus or the train, at the campus, where they can easily access to the online courses, also they feel comfortable when they use their mobile devices in learning. However, 15.6 % of them said No, because they find mobile devices distracting and there are cons when it comes to using the phone and that the increase of strain with the eyes etc. Others see that most students have laptops which have a bigger screen and a keyboard, so there is no need to use mobile devices.

Question 7: What do you think about using your prior knowledge to personalise the learning content?

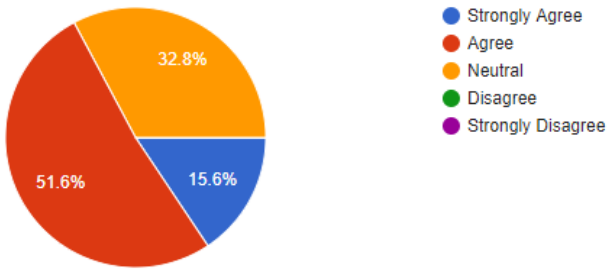

Figure 7. Students' opinion about the use of their prior knowledge to personalise learning content

Prior knowledge is one of the most influential factors in learning [8], it is the knowledge the learner already has before they meet new information. A learner's understanding of a text can be improved by activating their prior knowledge before dealing with the text, and developing this habit is good learner training for them. For example: A group of young learners are going to read about dolphins. First they talk about what they already know in a brainstorm activity. In the classroom; Pre-task activities are a good way to explore and share prior knowledge. Making predictions about content, answering true or false questions, agree on '5 things you know about...' and class or group brainstorming are all effective tools. [9]

Based on the results, 15.6 % of students are strongly agree, and 51.6 % of them are agree to use their prior knowledge to personalise the learning content, because it facilitates learning by creating mental hooks and it can lead to success in the classroom, and 32.8 % of them are neutral because they think that it's difficult to them to identify what is known or, more accurately, supposed to be known about a topic.

Question 8: Do you prefer that the learning content will be adapted according to the Network performance?

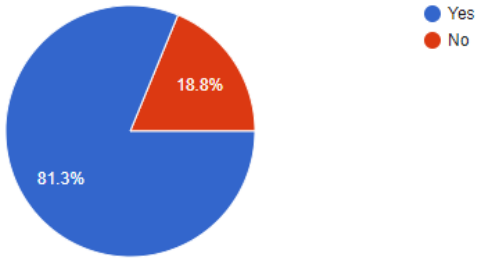

Figure 8. Students' opinion about the use of the network performance to personalise learning content.

Network performance refers to measures of service quality of a network as seen by the customer. There are many different ways to measure the performance of a network, as

each network is different in nature and design. They can be divided into four main groups: bandwidth, availability, delay, loss and error. [10]

From the Chart, it can be seen that the majority of students, 81.3 %, agree that the learning content will be adapted according to the Network performance, because it helps them to learn even if the network was slow and it provides them an easy access to the learning content, 18.8 % of them said no, because they think that it will not make too much difference, and information is already easily accessible. Others think that a slight delay isn't much of an issue to warrant learning to be adapted to slow internet.

Question 9: I agree that applying location-based techniques can assist my learning.

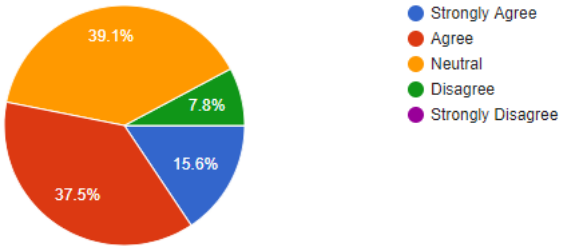

Figure 9. Students' opinion about the use of the location-based techniques to personalise learning content

Since learning becomes mobile, location becomes an important context, both in terms of the physical whereabouts of the learner and also the opportunities for learning to become location-sensitive. The properties and affordances of one's location vary enormously and hence other contexts become even more important, such as the task or goal or the user; the ubiquity of network access (GPS, wifi etc); the time of the year or day or even the weather. [11]
The results reveal that 15.6 % of students are strongly agree, and 37.5 % of them agree that applying location-based techniques can assist their learning, because it provides easier workflow efficiency, also it allows more things to be tailored towards them. The results also show that 39.1 % of students are neutrals and 7.8 % of them are disagrees, because they see that their location doesn't really matter when it comes to learning, also location can be spoofed, causing fraud.

5. Discussion

To understand the most important learning context from the learners' perspective in the learning process we have to use the 5 point Likert Scale, with numerical values ranging from, to give the weight to the responses. For example, for the question about personal preferences the total responses is 64 and the scale range is 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree and from our data 0 students are strongly disagree, we will then have 0x1=0, 1 student disagree (1x2=2), 19 students neutral (19x3=57), 33 students agree (33x4=132) and 11 students strongly agree

(11x5=55). So the total score = 0+2+57+132+55=246. Points=246/64=3.84. Table 1 demonstrates the score responses of each learning context.

Table 1. The score responses of each learning context

Learning Context	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Points
Collaboration with other learners.	0	23	0	41	0	3.28
Personal Preferences	0	1	19	33	11	3.84
Mobile device capabilities	0	10	0	54	0	3.68
Prior Knowledge	0	0	21	33	10	3.82
Network Performance	0	12	0	52	0	3.62
Location-based techniques	0	5	25	24	10	3.60

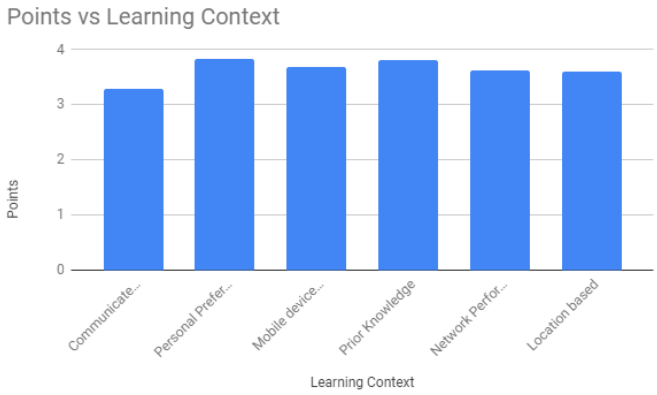

Figure 10. Understanding which learning context is important to the students

From the results showed on Table 1, it can be concluded that the most important learning context to the learners in the learning process is the personal preferences, because what suits one learner might not suit another. Most students learn in different ways and have a style or a preference to help them to learn best in their context, it is useful that awareness is raised about this. This may begin with understanding each learner's needs, and then developing personalised learning content to provide a more tailored education for every learner. The second important learning context is prior knowledge, in which they prefer to connect with what they already know about a topic before we start teaching them a new material. It is also important to assess prior knowledge and skills early since such information could be used to help foster student engagement and critical thinking in the course.

Finally, it may be concluded that personalise learning content in Mobile Learning process according to the technological context such as location-based techniques, mobile device capabilities and network performance supports the students to access learning resources online more easily and facilitates learning individually and availability of

learning content is really attracting students' interest on learning. Moreover, we have to focus more on the Learner's preferences and needs to promote a higher rate of engagement and motivation for learners and helps learners stay on track with learning process.

6. Conclusion

In this paper we have discussed the context in mobile learning from the point of view of the learners. We created a questionnaire, with the aim of understanding what learning contexts are important to the learners in the learning process. According to the results we conclude that the most important learning context to the learners in the learning process is the learner's preferences and needs, in addition to the prior knowledge. In our future work we plan to propose a new Context-aware Mobile Learning Approach in which we will focus on the learner's preferences. And Students' learning achievement would be better by using this new approach.

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The user-centric definitions of context and context-awareness are by Juan C. Augusto.

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