

An Experimental Case Study: Integrating Mobile Dimension from SMAC Technologies (Social, Mobile, Analytics and Cloud) within a SPOC

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Abstract

SMAC technologies (Social Media, Mobility, Analytics and Cloud Computing) are an emerging trend in Information Technology (IT) industry which is beginning to transform all aspects of our lives in a significant way. Leveraging SMAC technologies consists on adoption of modes of exchange based on social and collaborative technologies, create new mobile uses and integrate analytical technologies to leverage the data continuously growing of learners. In this paper, we were interested on mobile dimension and how to integrate it to the SPOC Employabilité, a six-week small private online course, created by Ben M'sik Faculty of Sciences and provided on Moodle. Two ways of mobile access were performed and explored: 1) using a mobile web browser and 2) using Moodle mobile app. This work is the first step in a more comprehensive work that aims at developing mobile accessibility to a MOOC in general in the era of SMAC technologies.

Keywords: SPOC - Mobile learning - SMAC technologies - Perceived usability – Responsive Design – Moodle mobile App.

1. Introduction

SMAC technologies (Social / Mobile / Analytics / Cloud) have chiefly emerged as a result of recent innovations in the areas of Social Media, Mobile, analytics and Cloud computing. The four abovementioned elements are considered to be the technological levers of a society that is full of digital transformation [1]. The use of SMAC technologies involves adopting social and collaborative

technologies, creating new mobile uses, integrating analytical technologies to exploit data or using new resources and services offered by cloud computing . In the domain of education, institutions are faced with a big challenge to launch a process of digital transformation in order to integrate different learning environments to SMAC model, in particular the MOOCs (open massive online courses) [2].

This article deals with mobile dimension and its adoption in the SPOC Employability. In fact, the ubiquitous growth of mobile technology in our society has become a reality. In Morocco for example¹, 94.4% of individuals (12 to 65 years) are equipped with mobile phones, the smartphone's park is estimated to 14.7 million and more than 50% of households are equipped with a computer / Tablet. More than half use mobile phones to have access to the internet, more importantly to have access to websites or to participate in social networks (89%), to download mobile applications (77.2%), to exchange text messages (65.1%), to access e-mails (51.1%) and to share Internet access (34.3%). Mobile technologies are attractive tools in education and have opened up new opportunities for teaching and learning.

Using an experimental study, this article scrutinizes two mobile access environments to SPOC Employability. The results are presented and analyzed. Also, recommendations for future research are included. The literature review focuses mainly on mobile learning, MOOCs and works that mingle these two learning formats.

¹ [Agence Nationale de réglementation des télécommunications \(ANRT\) - Enquête TIC 2015](#)

2. Research Background

2.1 Mobile learning (m-learning)

Research projects on mobile learning during the last twenty years were mainly directed towards exploring and exploiting every new educational technology showing how such mobile technology favors, widens and enriches the concept and the theories of learning, be it formal or informal [3]. The portability, the individuality and the availability are the headlight characteristics of such mobile technology that allow its users to easily access information according to their convenience any when, anywhere [4]. The new functions such as the image, the video, and the functions of GPS have increased the experience of mobile technology usage for contextualizing or personalizing learning.

2.2 MOOCs

The phenomenon of MOOCs attracted great attention at the end of 2012, which is known as the year of MOOCs. Thanks to flexibility in time and place offered/provided by these environments, the number of MOOCs has been increased. As a result, some research has been conducted to examine the diverse aspects of online learning, such as motivation, factors of MOOCs retention and social interaction and personalization [5]. According to [6], MOOCs will still dominate and shape e-learning in the future.

2.3 Mobile learning and MOOCs

Mobile learning and MOOCs are based on similar characteristics which are the use of social media, collaborative learning and informal learning. Both of them are ideal for constructing knowledge based on learner interactions and dialogue [7]. Concerning literature review, each field is rising separately and both are still exploratory in a world that changes rapidly either from a pedagogical or technical point of view. From 2013, some research has explored the combination of these two formats of Learning. In [8], the authors have proposed the combination of "MOOC and learning Mobile" through MobiMOOC, the first MOOC of 6 weeks accessible via mobile to analyze the situation of complexity and the chaos of the field of programming because of the considerable expansion of new technologies (social media, cloud

computing, MOOCs, mlearning...) and conclude that the combination of factors that characterize both the MOOCs and learning mobile will be regarded as a new educational environment adapted to the new knowledge society.

In [9], the authors report that the combination of these two learning formats is ideal to maximize interaction and dialogue between learners and fosters collaborative, informal and lifelong learning. In [10], the authors have examined the benefits of mobile access to different platforms (edX, Coursera, Udacity and Iversity) using a native mobile app OpenSAP and concluded that native applications provide more features than mobile browser, but they are not needed for responsive platforms. In [11], the authors showed that mobile access has a positive impact on participants' attention during an open online teaching training (SOOC: Strategic Open Online Course). In [12], scholars draw attention to many differences between mobile environment and desktop environment in which a MOOC is used. They also analyze changes in mobile learners' behavior in an offline context. The literature review conducted on current trends of MOOCs surveys MOOCs desktop and mobile versions; besides, it provides a framework to compare them [13]. In [14], the researchers analyzed the learning experiences students had in two different environments: mobile and desktop computers by performing tasks related to three MOOC platforms: Coursera, edX, and Udacity. They concluded that learners prefer to learn in computer desktop environment because mobile access presents different challenges including: screen size and keyboard absence. First MOOC platforms were not designed for mobile access, but because of the growth of mobile technologies, user's demand for mobile solutions has been increased [10]. The main platforms like Udacity, Coursera, edX, Moodle MOOC... offer a responsive design or native mobile application that allows mobile access to their platform MOOC.

2.4 MOOC providers and Mobile access

The first MOOC platforms were not designed for mobile access, but with the rise of mobile technologies, the demand from mobile users is growing [10]. The main MOOC platforms such as Udacity, Coursera, edX, Moodle ... offer a responsive design alongside allowing mobile access to their

Mooc platforms through offering their own native mobile application.

Table 1: Mobile support of major MOOC providers

Plateforme	Design Responsive	Native mobile App	OS supported
Edx www.edx.org	Yes	Yes	IOS/Android
Udacity www.udacity.com	Yes	Yes	IOS/Android
Coursera www.coursera.org	Yes	Yes	IOS/Android
Udemy www.udemy.com	Yes	Yes	IOS/Android
FutureLearn www.futurelearn.com	Yes	Yes	IOS/Android
Moodle www.moodle.org	Yes	Yes	IOS/Android
Khan Academy www.khanacademy.org	Yes	Yes	IOS/Android
Rwaq (Saudi Arabia) www.rwaq.org	Yes	Yes	Android
uc@MOOC mooc.uca.ma (Cadi Ayyad University -Marrakech)	Yes	Yes	Android
Edraak JORDAN https://www.edraak.org	Yes	Yes	Android

3. Research objectives

Merging the two emerging learning formats namely MOOCs and Mobile Learning bestows a remarkable possibility to positively transform learning through increasing interactivity and flexibility.

The main objective of the current study is to investigate the SPOC usability in the mobile arena aiming at drawing the necessary conclusions and remarks for future studies regarding the evolution and leveraging mobile dimension from SMAC technologies in the SPOC Employability.

4. Methodology

4.1 SPOC Employability description

The platform used in this experience is the SPOC Employability (Small Private Online Course). This course is created and designed on Moodle by members of the LAPSTICE1/ORDIPU2 laboratories

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and is intended for students of the MIMPA3 Master and those of the ITEF4 Master. The aim of the program is to set the scene for the integration of students into professional life and to help them acquire the knowledge and skills needed to find a job. The content of the SPOC Employability is arranged within six weeks:

- Week 1: Personal assessment;
- Week 2: Consideration of the needs of the world of work;
- Week 3: CV and cover letter;
- Week 4: Research argumentation and strategy;
- Week 5: Personal professional project;
- Week 6: End-of-training questionnaire and final evaluation.

4.2 Description of Methodology

To test SPOC Employability in a mobile environment, this study explored access to the course performed with two mobile environments:

Access via mobile web browser

Web Design Responsive is a way of designing websites using CSS (Cascading Style Sheets) that allows the web content to be adapted to different access environments regardless of the screen size of the user device be it from a desktop or a mobile device [15]. Most of MOOC platforms offer responsive designs. In other words, the SPOC Employability under Moodle framework, which is what the current research revolves around, also uses a responsive theme that is aligned with different mobile screens.

The SPOC Employability under Moodle uses a responsive theme that adjusts to mobile screens (Fig. 1).

Use of Moodle Mobile app

Moodle Mobile is the official mobile app for Android, IOS and Windows Phone which is developed and certified by Moodle HQ. It is available for free on Google Play, Apple Store and Windows App Store

² ORDIPU: Observatoire de Recherche en Didactique et Pédagogie Universitaire

³ MIMPA: Master Instrumentation et Méthodes Physico-chimiques d'Analyse

⁴ ITEF: Master Ingénierie et Technologie de l'Education et de la Formation

but only available on Moodle sites. This application allows: Viewing an offline course, receiving notifications of messages and other events, uploading pictures, audios, videos and other files as well as contacting other participants to name but a few. The settings required for using the mobile Moodle application were carried out at the level of the SPOC platform. In addition, the targeted participants of the present experiment were assisted to install it on their smartphones (Fig. 1).

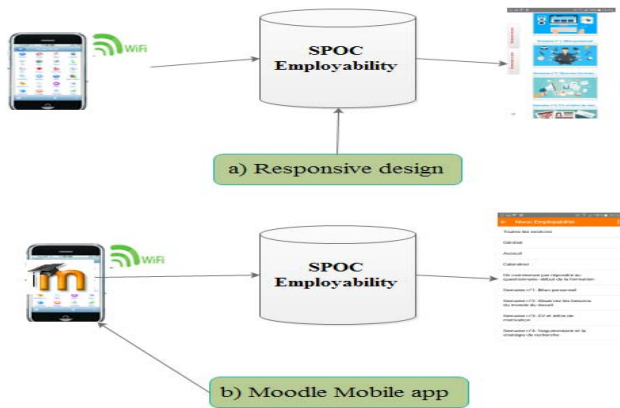


Fig. 1: SPOC Employability mobile environments architecture: a) mobile web browser - b) using Moodle mobile app

Population and study sample

Access to the SPOC Employability is open to all students of the Master's program of the Ben M'sik Faculty of Sciences. Two groups were chosen, totaling 50 participants, the students of the MIMPA and the ITEF Masters.

Tool used

An online questionnaire in Google Forms was administrated to students. It consisted of four sections. The first section is concerned with identifying student's experience in MOOCs in general. The second section deals with assessing the SPOC perceived usability in a mobile environment. In this section, the SUS (System Usability Scale) questionnaire [16] was taken up and adapted. It consists of ten questions and a Likert scale with five response modalities, ranging from "Strongly Disagree" to "Strongly Agree", to assess perceived usability of a product which is SPOC employability

in this study. The third part of the questionnaire focused on mobile features that students used to interact with other participants and / or the tutor and also on the most popular mobile features. The last part was about problems encountered and the overall satisfaction with the SPOC in a mobile environment.

5. Results and discussion

In this section, results of the experiment are presented and discussed. Fig. 2 and Fig. 3 represent screenshots respectively of the first mobile environment using a web mobile browser and the second using Moodle mobile app.



Fig. 2: Screenshots of the SPOC mobile environment using a mobile web browser (Responsive design)

SPOC Main Menu

Content of Week 1

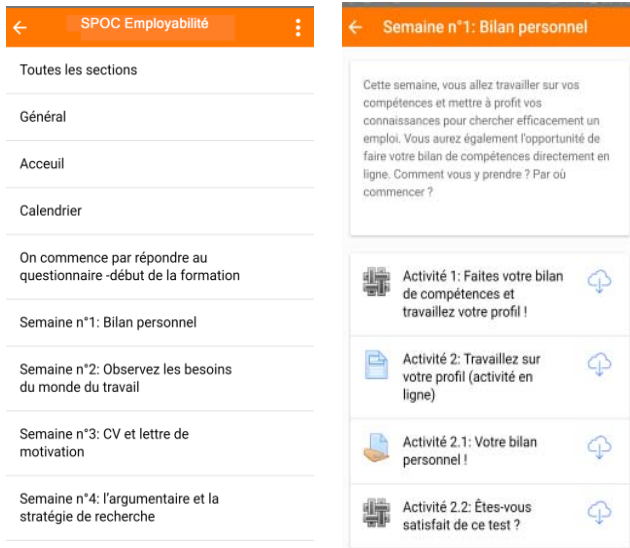


Fig. 3: Screenshots of the SPOC mobile environment using Moodle mobile app

Section 1: Students Identification and experience in MOOCs.

All students have a smartphone (96%) or a tablet (4%) and already have experience in MOOCs in a desktop environment (68%).

Regarding the operating systems of the devices used during the experiment, the majority (86%) was under Android (Fig. 4):

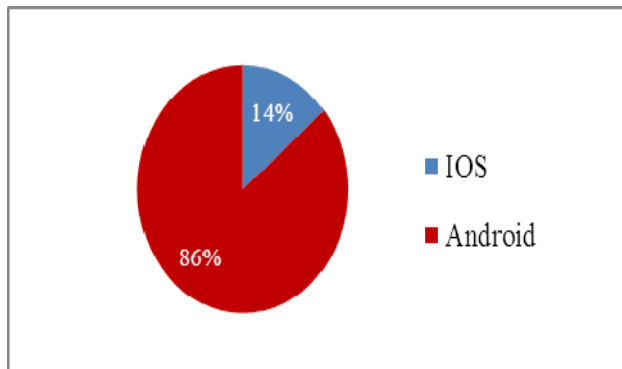
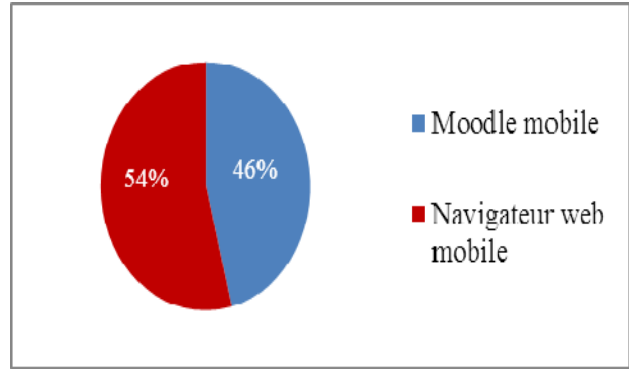


Fig. 4: Operating systems used in the experiment

Fig. 5 shows that 54% of the students used a mobile web browser and 46% used Moodle Mobile app.



Fig; 5: SPOC Employability mobile environment repartition

Section 2: Evaluation of SPOC mobile environment perceived usability

For the assessment of the perceived usability of SPOC in a mobile environment, the median SUS score was estimated to 63.75 out of 100 and the values varied from 40 to 75 with an interquartile range of [52.5; 67.5]. Referring to [17], the SUS obtained corresponds to a D-score and to a qualifier between "ok" and "good".

It should also be noted that the SUS depends slightly on the chosen mobile environment (Table 2):

Table 2: SUS score of the two SPOC Employability mobile environments

mobile Environnement	SUS médian	SUS min	SUS max	Interquartile range
mobile browser	72,2	42,5	85	[57,5; 77,5]
Moodle mobile app	55	40	77,5	[47,5; 67,5]

According to [17], the mobile environment using a mobile web browser can be qualified as "Good" and the mobile environment using Moodle mobile app can be qualified between "ok" and "Good". This is probably due to the appearance of the SPOC Employability with responsive design which displays illustrative images and adjusts the same platform content to different screens; On the other hand, the native Moodle Mobile app presents the SPOC in different way from the platform. The lack of images and labels of video content also affects the usability of this SPOC in mobile environment.

Section 3: Mobile features and characteristics

Regarding to mobile characteristics, learners appreciate mainly portability, time and location flexibility, individuality of the device and adaptability at their convenience.

Concerning mobile physical characteristics (screen size, absence of the keyboard, touchscreen), it was noted that they do not pose problems for the learners. To communicate with their peers or their tutor, the students mainly used mail, facebook, sms, whatsapp and twitter (Fig. 6).

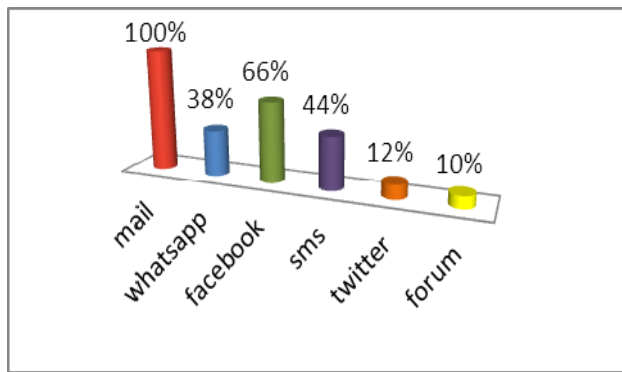


Fig. 6: Tools used by students to communicate with other students/tutor

Regarding the videos, given that their average duration did not exceed 8 mn, the students were able to view them online without using the possible download in Moodle mobile, a feature appreciated by (54%) who find that they can download a resource for one offline consultation is convenient.

Section 4: Problems encountered and overall satisfaction with SPOC Employability in a mobile environment

The main problems and limitations of the mobile environment encountered by students are: the speed of loading a video that is slow, the labels of videos not visible under Moodle mobile and also the access limitations due to the battery of smart phones. Despite these limitations, students were overall 62% satisfied with the mobile environment of the SPOC Employability.

To complete and respond to their preferences between desktop and mobile environments, 43% of

students prefer hybrid use of both environments (Fig. 7).

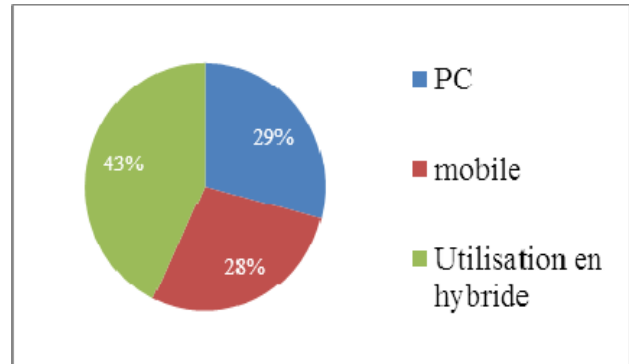


Fig. 7: SPOC environment preference between desktop and mobile

6. Conclusion and future works

Mobile evolution in the scope of MOOCs face a real challenge of providing a learning environment that would meet the actual needs of the growingly mobile users who live in an era where ubiquitous learning has become an inevitable emerging trend. Besides, the majority of MOOCs' platforms offer courses which are adapted to mobile technology either by using a forthcoming design or by offering a dedicated native mobile application enabling them to easily access their platforms via mobile. This experimental case study focused on examining the external environment of the SPOC. It has also assessed the perceived usability of the latter in a mobile environment to 63.75 out of 100. Students prefer a hybrid use of both desktop and mobile environments to follow a MOOC in general. It was also noted that a reactive design allows for mobile access without major constraints regardless of the need for internet connection availability. Moreover, a reactive design offers a workable environment better than the native Moodle mobile application which, nevertheless, has the advantage of following an offline MOOC; though some of its features require access to the online platform such as quizzes.

Future studies will tackle different dimension, namely the content of a mobile MOOC and the appropriate teaching scenario. It will also focus on media coverage of the content to be proposed taking

into account the constraints of the mobile environment.

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