

## Experience with Teaching an Online Course in Mobile App Development for Senegalese Students and Professionals

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### Abstract

Online education has been described as a means to transform access to education and increase opportunities at a global scale. In this paper, we describe our experience with teaching an eight-week online course in mobile app development for Senegalese students and professionals. The course design and delivery leverage our understanding of the Senegalese context, and emphasized direct communication and the use of peer-review practices and professional tools such as Slack and GitHub. We focus on participants' motivation and experience. The preliminary results we present are useful for academic institutions, tech hubs and capacity building organizations targeting developing markets.

**Keywords:** Android; Education; GitHub; Mobile App Development; Online Education; Senegal; Slack.

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### 1. Introduction

Online education is growing rapidly worldwide. Its potential and challenges have been reported extensively in the popular media and as an academic research topic. Developing markets are particularly interested in online education (including MOOCs) to improve access to higher education [1,2]. The Université Virtuelle du Sénégal <http://www.uvs.sn> was founded in 2013 for this reason. It mixes the delivery of online courses with the use of physical spaces to foster social interactions and retention.

In this paper, we describe our experience with teaching an online course in mobile app development for Senegalese students and professionals as part of the Mobile4Senegal initiative. Mobile4Senegal <http://mobilesenegal.org> is a capacity building initiative focusing on teaching mobile

app development in Senegal since 2009; it has trained more than 500 mobile developers in boot camps, crash courses and university courses [3].

We offered our first online course in mobile app development in summer 2016. To our knowledge, this is the only online course on Android development in Senegal. Its design and delivery leverage: 1) our understanding of the Senegalese context (including the French language); 2) the use of peer-review practices to create a sense of community; and 3) professional tools such as Slack <http://slack.com> for communication and GitHub <http://github.com> for software development.

In this paper, we describe participants' motivations and experiences. We briefly discuss how to improve online teaching of technical subjects such as mobile app development for audiences in developing markets.

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## 2. Course Description

**Course Content.** The online course spanned eight weeks. The course covered mobile app development with Android Java. The topics were Android Studio; GitHub; User Interface (UI) Design and Material Design; Menus and Intents; AsyncTask; Firebase and SQLite; Lists; and Location-based Facilities and Google Maps.

**Methodology of Instruction.** The course was administered via Moodle. The design of the course was such that students developed technical and soft skills, and gained theoretical and practical knowledge. The material was organized by week, separating course documents and assignments. Lecture notes and code were posted on GitHub twice a week. The course integrated bi-weekly quizzes, programming assignments and discussions. A midterm and a team project were introduced in week four. While the material was developed in English, the course was administered in French. Student contributions were in French. Direct communication was organized through Slack, an online platform for messaging that supports teams' communication and collaboration. Slack channels were created for participants to post questions and get clarifications in a structured way and to support teamwork during the project.

**Participants.** Thirteen participants (seven females and six males) registered for the course. They included seven students currently on vacations, seven students engaged in internships and two professionals. They were majors in computer science, telecom and mathematics. All participants were familiar with Java and owned an Android phone. They were distributed across Senegal; they lived in Dakar, Thiès, and Ziguinchor.

**Data Gathering.** Surveys were used to gather initial data about the participants (entry survey, thirteen respondents) and to evaluate their experience (exit survey, five respondents).

## 3. Findings and Discussion

**Motivation.** Six participants already enrolled in mobile development courses at their universities (3), with Mobile4Senegal (short courses) (3) or online (Coursera) (1). They embarked in the course to be better prepared in Android development, develop their own apps, and update their skills (e.g., Firebase). 100% of the participants completed the course.

**Experience.** 60% of the respondents were satisfied and 40% were very satisfied. They considered the project (60%) and the programming assignments (40%) to have been crucial in understanding the material. 80% considered that videos should be added to the course. 100% mentioned that the use of Slack was very important to support the communications between students, and students and

instructor. Participants used Slack to ask questions, get feedback, and assign tasks and discuss the project. Respondents mentioned that they improved their English skills (100%).

**Projects.** Participants presented six projects that integrated Material Design and Firebase. Projects focused on education (app to prepare for the middle school exam in Senegal), health (app that provides information on medications), transportation (app to notify about traffic issues), personal finance, and beauty (app that gives beauty advice for Senegalese women and an app to locate hair salons and suggest hairstyles).

**Challenges.** Bandwidth limitation was an issue mentioned by 40% of the respondents. When travelling, participants relied on 3G; this was not sufficient for GitHub delivery of assignments. Deadlines were not always met and the course ran one week late. The end of Ramadan holiday took place during the course. Power outages occurred in Ziguinchor. Participants had busy schedules with jobs, internships and regular university courses. Technical issues such as instability of Android Studio and out-of-date documentation on Android were commonly reported.

**Discussion.** Online courses need to take into account the context of the participants and the targeted country (language, culture, infrastructures etc.). In addition, teaching technical topics comes with its own specificity. Mobile app development for Android requires continuous access to Internet to consult resources (e.g., Stack Overflow and official Android documentation). It is difficult for participants to navigate the online resources and distinguish between the different versions of Android. Videos are useful for students to understand the material but need to be updated with each new version of Android. Most resources are available only in English.

**Future Work.** We plan to offer the second version of this online course in summer 2017. Based on the initial feedback, the course will integrate videos and we will leverage the peer-to-peer relationship to scale. The material will be designed to be accessible more easily offline and online.

## References

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