EducaMovil: A Mobile Learning Tool for Low-income Schools

Abstract

This paper describes *EducaMovil*, a tool to develop quiz-based mobile games for Java-enabled feature phones. The tool has two main components: a PC application that allows teachers to create educational contents, and a mobile game for students to learn while playing anytime, anywhere. EducaMovil works on feature phones and constitutes an affordable solution for low-income schools willing to deploy mobile learning solutions. Additionally, EducaMovil promotes the creation of local content adapted to the students' backgrounds and needs. The tool is currently being used at a low-income school in Lima, Peru.

Keywords

mobile education, game-based learning, low-income schools

Introduction

The pervasiveness of cell phones across regions and social groups has brought about a plethora of new mobile learning services. In the specific case of low-income regions, schools tend to have scarce educational resources which often times has an impact on students' motivation and their performance. Given the high ownership rates of feature phones across the low-income student population, mobile learning has

been proposed as an affordable solution to complement formal schooling while keeping students engaged and motivated. Additionally, the learn anywhere-anytime paradigm which proposes the access to educational contents in informal settings e.g., while commuting or waiting for the public transport, is specially important in low-income regions where students might suffer more from long commutes and school absenteeism.

A large collection of mobile learning tools propose the use of smartphones or high-end phones to deliver educational content [5]. Nevertheless, the availability of mobile learning tools for feature phones, which are the most common platform in low-income regions, is still very limited [4]. Kam *et al.* have shown that mobile learning games (*MILLEE*) can help rural kids learn English in after-school programs in India [2]. Similarly, the *DrMath* project has offered learning contents to hundreds of kids in South African schools [1]. These mobile learning games are showing encouraging results, however, they suffer from an important drawback: the games are typically designed specifically for one academic subject, and require extensive engineering knowledge to be modified. Unfortunately, this model does not scale, since teachers wanting to create additional educational contents or wanting to localize the contents to other languages will need technical (and economic) support to do it.

In this paper, we present *EducaMovil* a tool that advances the state of the art introducing mobile learning games where the educational contents are created, modified, re-factored and automatically compiled into a game by the teachers themselves [3].

EducaMovil has the advantage of reducing educational costs while enhancing localized content authoring, both critical for schools in low-income regions. In fact, *EducaMovil* does not require large budgets or engineering knowledge because it automatically embeds the educational contents created by teachers into the games thus reducing the creation costs. Additionally, by involving teachers in the mobile learning process, it allows for a continuous and sustainable adaptation of the game to the curricular activities of the classroom.

The Tool

EducaMovil is an educational platform with two main components: (1) a PC tool for teachers to create educational contents and (2) a mobile game-based application for students to explore educational information. The PC tool allows teachers to create the educational contents and to easily embed them into a game that can be downloaded onto the students' cell phones via Bluetooth. On the other hand, the mobile games offer students the possibility of playing their favorite games while learning or reviewing the teacher-created contents. Next, we explain these two components in detail.

PC Tool

Figure 1 shows the user interface for EducaMovil's PC tool. The tabs at the top show that teachers can either *Create Lessons* or *Distribute Lessons* to the students' cell phones. Teachers can create a lesson by specifying the title of the lesson, a short description, the subject that covers the lesson and its educational grade. This information helps teachers to keep a record of the lessons created by other teachers and promotes content sharing across classes. Each lesson
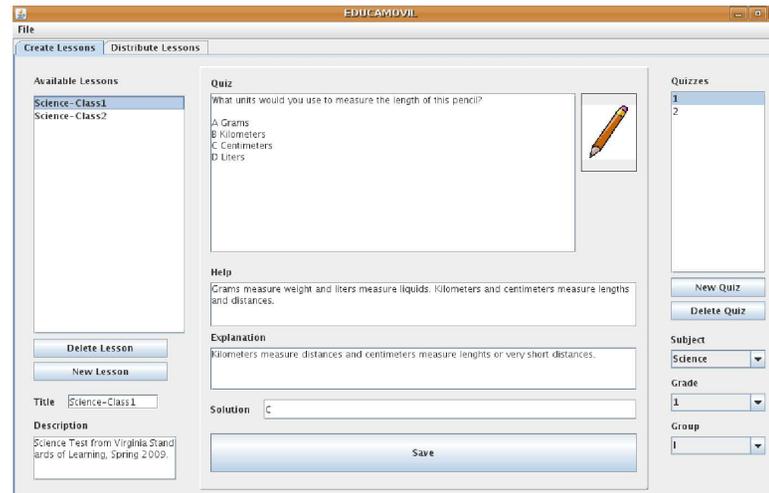
**Figure 1:** PC tool with a lesson created by a teacher.

can be composed of one or more quizzes covering the lesson's subject. Each quiz is shown to the student at specific moments during the mobile game as a means of wining points and moving to the next levels. Quizzes are composed of a text (question) and might include an image. Although not required, we recommend teachers to use multiple-choice questions so as to avoid long error-prone answers due to the limitations of a feature phone's keyboard. Teachers are required to provide both the quiz and its answer, and are encouraged to also provide a piece of help and an explanation. The help button in the mobile game shows a hint to guide the student towards the correct quiz answer, and is shown whenever the student presses the button before giving an answer. On the other hand, the explanation is shown in the mobile game whenever a student runs out of chances to answer the quiz *i.e.,* if the student does

not successfully answer the quiz after three attempts, the solution and explanation are shown and the quiz is not presented again to the student.

Once the quizzes have been created, teachers can prepare the mobile games. The tab *Distribute Lessons* (see top of Figure 1) allows teachers to explore all the available lessons and their quiz contents and decide which lessons they want to bundle into a game. Given that the game is downloaded via bluetooth to the cell phones, teachers simply need to select the cell phones that they want to send the game to (*Find Devices* button) and click on *Send Lessons*. At the end of the process, all students cell phones will contain the game with the educational contents selected by the teacher.

Mobile Application

EducaMovil's mobile game-based application works on Java-enabled features phones. The objective of the application is to engage students in learning games that present and review educational contents created by their teachers. Figure 2 shows different screenshots of the mobile application. The game starts with an initial menu where students can: (i) select a mobile game (Tetris or Snake); (ii) read the instructions; (iii) check the highest scores list or (iv) check the game performance statistics.

(a) Quiz.　　　　(b) Top Scores.　　　　(c) Statistics.
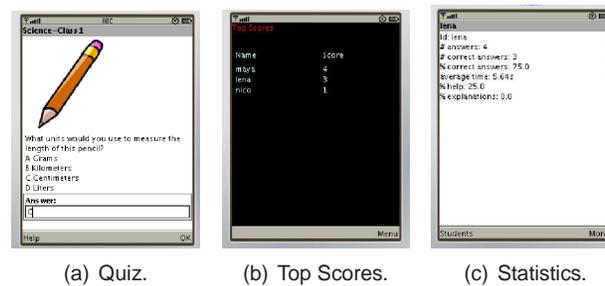
Figure 2: EducaMovil Mobile Application.

Onc the game is selected, the student is shown quizzes randomly selected from the pool of educational contents that the teacher embedded into the game. Students need to provide an answer so as to continue playing with the game (see Figure 2(a)). As shown in Figure 2(b), students can go back to the initial menu at any time to check their points and compare themselves against the highest scores. Finally, students and teachers can review game performance checking the statistics screen that shows the student's interactions with the game: number of correct and incorrect answers, time invested, number of times the students

required help or were shown and explanation, and the specific questions that students failed or succeeded in answering (Figure 2(c)). This information is primarily used for the analysis of the educational impact of *EducaMovil* at schools.

Scenarios and Demo

EducaMovil has the potential to help low-income schools in the deployment of affordable mobile learning programs that enhance localized content authoring. The tool is currently being used by students at a school in Lima (Peru) in two different settings: the formal environment of a classroom and the informal environment of the school breaks. Our preliminary results show that EducaMovil improves knowledge acquisition in both settings as long as there is a continuous student engagement over time.

The demo focuses on allowing researchers to interact with EducaMovil and experience what teachers and students go through while using the tool. Additionally, we also hope to share our experiences in the deployment of learning games at low-income schools and encourage researchers to deploy EducaMovil in other schools around the world.

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