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M-LEARNING APPLICATION "MALA MATURA"

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Abstract: *Bearing in mind the tendency of growing use of mobile devices, and for the purposes of more efficient preparation of elementary school students for taking the final examination (in Serbian the so-called "Mala matura" - little graduation), company LINK group, in cooperation with Information Technology School and Information Technology High School, from Belgrade, developed the mobile application "Mala matura". This paper first summarizes the concept of m-learning, and provides an overview of the possibilities of application of mobile services in e-learning system, and goes on to describe possibilities and way of use of this application for learning using mobile devices.*

Keywords: *M-learning, Android, Elementary school, High school, Serbian language, Mathematics.*

1. INTRODUCTION

Preparation of final examination at the end of elementary school (little graduation, Serbian - "Mala matura") is very stressful and hard for the majority of students. On the other hand, the same students enjoy using mobile devices (such as mobile phone or tablet) in everyday communication or games. It is therefore logical that they should receive the possibility to study and practice, i.e. prepare for such final exam, using those devices. Hence the idea to make a mobile device application for preparing for little graduation. This paper, after offering a brief overview of the possibilities of use of mobile services in learning and education, describes the mobile application "Mala matura", developed in order to make preparation of elementary school students for taking the final examination at the end of elementary school (little graduation), which is also one of the elements involved in ranking for enrollment into high schools. The application was developed by company LINK group, in cooperation with Information Technology School (ITS) and Information Technology High School (ITHS), from Belgrade. Application works under the Android operating system. It is made in Serbian language, and can be used with Latin or Cyrillic alphabet. Use of the application is free and it has over 12,000 users.

2. M-LEARNING

M-learning is based on interaction between mobile devices and learners. M-learning is the acquisition of knowledge or skills through the use of mobile technology anywhere and anytime [1].

M-learning enables one-to-one interaction, time independence, personalization, and extended reach [2]. M-learning may enrich students' learning experiences as it facilitates collaboration and informal interactions between them, builds social capital, and motivates disengaged or at-risk students [1].

Some authors defined m-learning as the intersection of mobile computing and e-learning that includes anytime, anywhere resources; strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment [3].

Using mobile devices in learning activities offers some benefits [4]:

- Improved communication and collaborative interaction,
- The provision of more learning opportunities for geographically distant people and groups,
- The encouragement of active learning,
- The enhancement of feedback to learners,
- An emphasis on task,
- The acquisition of content quickly.

Mobile devices are limited by screen size, battery capacity, and network bandwidth [5].

3. M-LEARNING IN EDUCATION

Mobile technologies are one of the fastest growing areas of technology. For educators, they offer an appealing opportunity for learners to transcend teacher-defined

knowledge or approaches by accessing multiple, alternative sources of information [6].

Mobile devices exemplify relatively strong computing capability built in the small sizes, Internet connectivity and the availability of various types and easy-to-use mobile apps. Powerful mobile devices coupled with mobile apps conducive to participation, sharing and communication can make collaboration at distance easier [7].

Mobile devices have added a new dimension and capabilities to situated learning. Some of the mobile functionalities that help in situated learning include [3]:

- Geospatial technologies (GIS, GPS, RFID, Bluetooth),
- Mobile search,
- Use of camera for image capture,
- Social networking.

Enrichment of context-aware technologies has enabled students to learn in an environment that integrates learning resources from both the real world and the digital world [3].

M-learning is becoming an increasingly promising way of delivering instruction in education. This is justified by the current statistics about the prevalence of mobile devices among university students around the world, as well as the emerging m-learning applications in several universities [8]. The portability of mobile devices not only enables students to learn across contexts, but also provides teachers and educators with opportunities to develop new learning models, Image 1 [9].

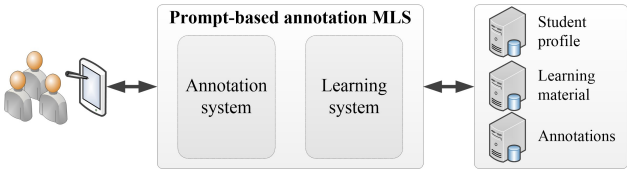

Image 1: Structure of the m-learning system [9]

4. MAIN CHARACTERISTICS OF MOBILE APPLICATION "MALA MATURA"

Following modern tendencies in the information technology field as well as needs in the education system, company LINK group (www.link.co.rs), Information Technology School (ITS, www.its.edu.rs) and Information Technology High School (ITHS, www.iths.edu.rs) created an application called "Mala matura". LINK group is a leading international company that successfully works in professional education and certification from the fields of information technology and modern business. The company operates in Serbia, Bosnia and Herzegovina, Romania, and Ukraine, and through distance learning it brings together students from over 120 countries worldwide. Information Technology School is the first accredited private higher education institution in information technology field in Serbia. Within the school's education processes, teaching is realized through four study programs: Information Technology, Computer Multimedia, Electronic Business, and Business Systems Management. LINK group, ITS and Comtrade company from Belgrade founded Information Technology High School, which constitutes the first educational institution of this type in Serbia.

The choice for development environment of the "Mala matura" application was the Android operating system. Android is one the latest operating systems for modern mobile devices, proposed by Google and the Open Handset Alliance. Android is based on the Linux kernel and it is available under an open source license. The Java programming language forms the core of the entire Android. All Android applications have the same operating systems rights and privileges and can make use of the majority of the devices' functionalities [10]. Main characteristics of Android platform include automatic application lifecycle management, rich database of useful program libraries and tools for making new applications, high-quality graphic display and sound, compatibility with majority of current and future hardware, support for multimedia data, Bluetooth, Tethering, etc. [11].

Mobile applications are commonly also called mobile apps. These terms are used to describe Internet applications or small bundles of code designed and developed to run on mobile devices. They are intended to enhance features of mobile devices, providing additional functionalities and utilities that increase the devices' utilitarian and entertainment features. There are several kinds of mobile device applications, such as games, Internet applications, widgets, calendars, email utilities, sports information, and so on. This segment of mobile technology has ballooned with the widespread use of smartphones, portable music devices, and other mobile web-capable equipment [10].

Using the application "Mala matura", elementary school students can prepare for taking the final examination free of charge. After creating a user account within the application and logging in, students can choose among the following options (Image 2):

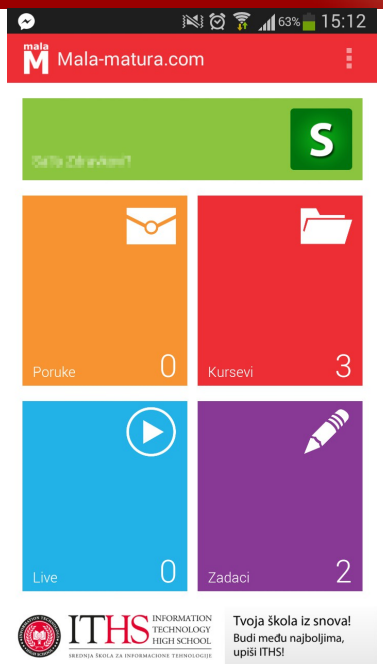

Image 2: "Mala matura" application start screen

- Personal card - Basic information about the student.
- Support - Student can send a message to technical support, retrieve documents and instructions, contact with technical support live, via chat (Image 3).

Image 3: Chat room for students

- Instructions - Documents and instructions are available in PDF format, and the student can download them using his mobile device.
- Messages - Student's mailbox, containing received messages, sent messages, drafts and system messages.
- Tasks - Mandatory tests. For every test, a title is displayed, along with the field it belongs to and the recommended date by which the students should complete the test. Test questions are displayed to student one per page.
- Courses - Through their mobile devices, students can attend courses (Image 4) and solving the accompanying tests for assessing the knowledge in Serbian Language and Literature or Mathematics, which cover the entire material covered by little graduation (Image 5).

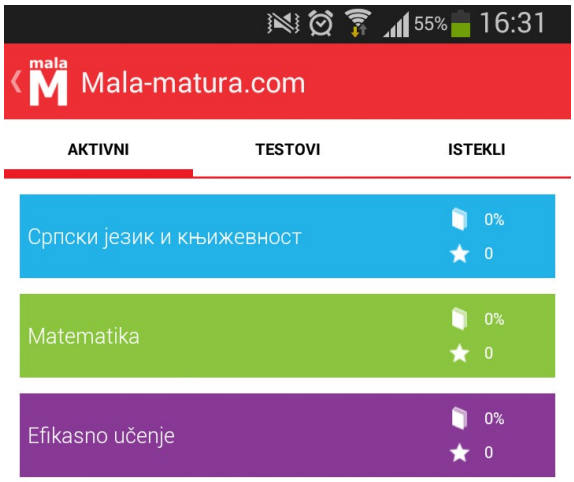

Image 4: Available courses in "Mala matura" application

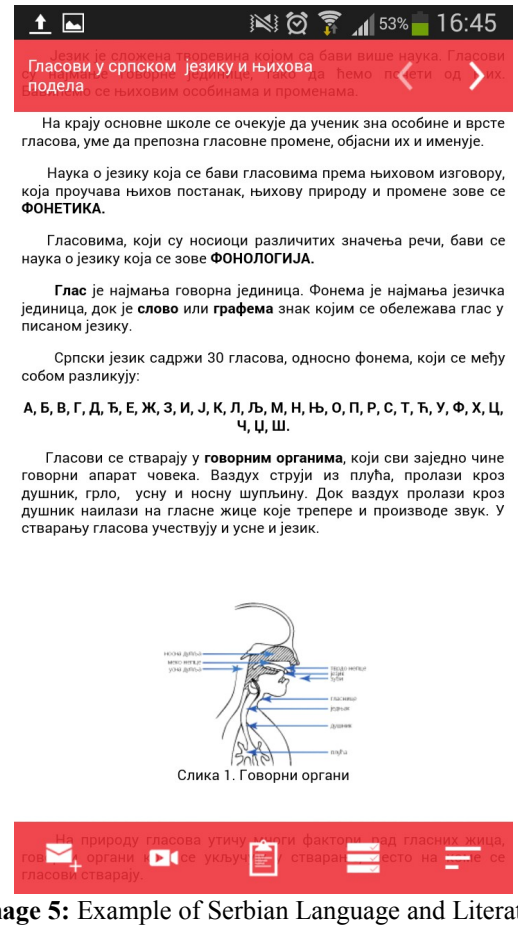

Image 5: Example of Serbian Language and Literature lesson

A part of application "Mala matura" constitutes a simulation of the final exam for elementary school students (Mathematics, Serbian Language and Literature). The final test comprises questions included into the official collection approved by the Ministry of Education, Science and Technological Development of the Republic of Serbia. According to its number of questions, difficulty of questions and the designated time for solving, the test corresponds real conditions in which students take the final exam in their schools (Image 6).

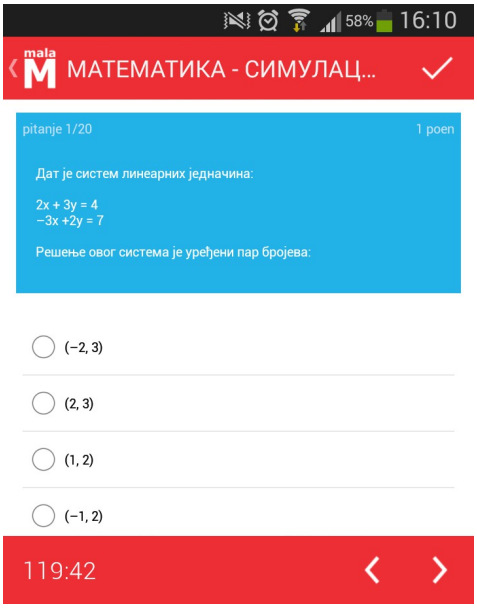

Image 6: Final mathematics test simulation

When the application became available to users at Google Play, in a short time it reached number one as the most popular application in the field of education in Serbia and the region. Application "Mala matura" is currently used by over 12,000 users, and the users awarded it average grade 4.08 on a scale from 0 to 5.

5. CONCLUSION

Increasingly wide use of e-learning with the tendency of increasing use of mobile devices (m-learning) brought about the development of mobile applications. This paper describes one such application, for more efficient preparation of elementary school students for the final exam and preparation for high school enrolment, called "Mala matura", which covers subjects of Serbian Language and Literature, Mathematics, as well as a combined test.

It can be used at any time and from any location. The user can, using his mobile device, download documents and instructions (in PDF format), study, solve problems, asks a teacher a question, use exam simulation, send a message to technical support, contact with technical support live, via chat.

The application has been developed under Android operating system, its use is free of charge, and it has over 12,000 users.

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