Using Smartphones in Sports Education

Shinya Iwasaki[1], Kenneth J. Mackin[1], and Masahiro Ishii[1]

[1]Tokyo University of Information Sciences, Chiba 265-8501, Japan
(Tel: 81-43-236-1329, Fax: 81-43-236-1329)

mackin@rsch.tuis.ac.jp

Abstract: Applying e-learning to hands-on education such as physical education has been difficult due to hardware and network restrictions in an out-of-classroom environment. In this research we propose using smartphones for sports education to improve the learning curve of athletes. There has been previous research reported on using carrier specific cellular phone applications for sports education. While the previous approach reported effectiveness on using mobile devices for education assistance, the carrier specific cellular phone approach had functional and interface limitations due to the hardware restrictions. For this research, we developed a Google Android application for sports education, namely track and field use, to support both the learner (athlete) and the educator (trainer). For the proposed application, we made use of the touch panel feature of Android hardware to facilitate data entry for the users. Validity of the proposed system was verified through experiment.

Keywords: Smartphones, Google Android application, sports education, e-learning

1 INTRODUCTION

Applying e-learning to hands-on education such as physical education has been difficult due to hardware and network restrictions in an out-of-classroom environment. In this research we propose using smartphones for sports education to improve the learning curve of athletes. There has been previous research reported on using carrier specific cellular phone applications for sports education. While the previous approach reported effectiveness on using mobile devices for education assistance[1], the carrier specific cellular phone approach had functional and interface limitations due to the hardware restictions. For this research, we developed a Google Android application for sports education, namely track and field use, to support both the learner (athlete) and the educator (trainer). The developed application targets men's decathlon and female's heptathlon, and calculates the points achieved for each event, and displays the current total score. The decathlon and heptathlon event is a 2 day competition, with decathlon athletes competing in 10 different events, and heptathlon athletes competing in 8 different events. It is important for each athlete to manage how much energy and strength should be spent on each event, in order to complete the 2 day competition. The calculating program is used by the athlete to check current performance, but more importantly used to simulate target records for coming events, in order to set a goal for each individual event performance. The same use applies to the trainer, where the trainer will simulate possible performances and give advice to each athlete based on the simulation results.

Capability for managing multiple records was implemented, so that the learner can compare previous and current performance. The feature is also used by the educator to manage multiple students at the same time.

Effective user interface for sport education was taken in consideration. For the previous research using standard cellular phones, data input was through number buttons only. For the proposed application, we made use of the touch panel feature of Android hardware to facilitate data entry for the users.

Validity of the proposed system was verified through experiment.

2 SMARTPHONE PLATFORM

In order to promote the use of e-learning for sports education, there are several barriers that must be overcome. Firstly, e-learning for sports education requires that each participant has access to the e-learning system, so expensive hardware or limited hardware support will be against the motivation. Secondly, the e-learning system must be easily carried outdoors where sports education will take place, so the size of the hardware should be able to fit in a pocket. Thirdly, the hardware should have enough computing power and features to run complicated sport education support applications.

To clear the above requirements, smartphones were selected as the target hardware for this research. In particular, Google Android was selected for the smart phone platform. Android is a free and open source operating system for mobile devices, mainly smartphones and tablet computers. The first commercial version,

Android 1.0, was released in September 2008. By the end of 2011, Android had grown to become the largest smartphone platform in many markets. In this light, Google Android was selected for the research platform to provide the large client base, and easy development environment.

Important features of Android utilized in this research are Java programming language development support, touch panel user interface support, sandbox memory access for application memory, and file read/write capability.

3 SPORTS EDUCATION APPLICATION

In this research, a sports education support application was developed with the following specifications.

Supported OS: Android

Supported version: 1.6 or newer

Supported screen size: HVGA or better

Supported installation: Download via Google Android Market

Android OS is currently the largest smartphone platform on the market, and while the latest Android version for smartphones is version 2.3, support for version 1.6 or newer was targeted to allow close to all of the current Android smartphones to be covered. For the same reason, minimum supported screen size is HVGA, in order to allow a large range of supported hardware.

Android applications can be distributed easily over the web, but for this research, the developed Android application was distributed through the Android Market, Google's official online software store for Android applications, to facilitate installation into client devices. The Android Market was also used to collect feedback and comments from users.

For this research, we developed a Google Android application for sports education, namely track and field use, to support both the learner (athlete) and the educator (trainer). The developed application supports the following 2 track and field events:

1) men's decathlon event and

2) female's heptathlon event.

The developed application calculates the points achieved for each event, and displays the current total score. Fig.1 shows a snapshot of the application running the men's decathlon score calculation.

Fig. 1. Decathlon score calculation application

For the calculation program for both events, the following supporting features were implemented.

1) Simultaneous score calculation during user record entry.

2) Multiple file support for saving record and score status.

Simultaneous score calculation during user record entry was implemented to minimize user operation. By this feature, users do not have to select a separate button to initiate calculation, and also does not require unnecessary zeros after the decimal point.

Multiple file support of score tables allows a single user to keep records of previous records of the same athlete, as well as keep records of multiple athletes for the same event. Fig.2 shows the multiple file selection for the developed application. Multiple file support enables athletes to compare their current record and progress with past records on previous decathlon/heptathlon events. Athletes can estimate their final score, and motivate themselves to improve their record, as well as allow the athlete to simulate how much effort must be put in the individual events still left, in order to keep ahead of the competition or improve personal records. For the coaches (or educators),

multiple file support allows the coach to keep track and compare the individual scores for each athlete competing in the same event, including scores of the competition. The coach can compare the scores of each athlete and their previous records, to give more precise advice on strategy on which individual events to save stamina and which events to give extra tries.

Fig. 2. Multiple file selection screen

4 EXPERIMENT RESULTS

The developed Android application was registered in Google Android Market as "Track and Field Combined Event Calculation Tool" for public access, as a free application. Fig. 3 shows the registered application as seen on Android Market. The developed application was the first registered Android Market application for track and field combined event (decathlon and heptathlon) score calculation to support Japanese. We also asked the Tokyo University of Information Sciences track and field team coach to use the application and asked for feedback regarding the effectiveness of the application for sports education.

On the Android Market, as of November 30, 2011, there has been over 500 downloads of the developed application,

and the overall rating of the application is 4.4 from a maximum 5.0 . There had been 1 report on a program error, which was immediately fixed and the fixed program uploaded. Another comment gave positive feedback on requested features for user interface.

From the track and field coach, positive comments on the effectiveness of the application on sports education were received. Further enhancements on the user interface were also requested, such as being able to show multiple athletes' records on 1 screen, or a 1-click feature for quickly switching multiple athletes' records.

Currently, the effectiveness of the developed application has not yet been evaluated statistically, but from user reviews on the Android Market and direct feedback from the track and field coach, the developed application running on a smartphone was shown to be effective in sports education support. Compared to previous reports using mobile phone applications, the developed application using smartphones enabled multiple file support as well as touch screen user interface, and greatly improved on accessibility and operability.

Fig. 3. Application registered in Android Market

5 CONCLUSION

In this research we propose using smartphones for sports education to improve the learning curve of athletes. In order to promote the use of e-learning for sports education, smartphones were selected as the target hardware for this research. In particular, Google Android was selected for the smart phone platform for the large client base and ease of development. We developed a Google Android application for sports education, namely track and field use, to support both the learner (athlete) and the educator (trainer). The developed application targets men's decathlon and female's heptathlon, and calculates the points achieved for each event, and displays the current total score. In the developed application, features for 1)

simultaneous score calculation during user record entry, and 2) multiple file support for saving records and scores were implemented.

From user reviews and comments from an active track and field coach, positive feedback on the effectiveness of the proposed application for sports education were received.

For future works, improvements on user interface based on user requests will be implemented. Further, we plan to create a client-server model for sports education to allow data sharing between learners and trainers, and support real-time educational feedback from trainers to learners.

REFERENCES

[1] Kenneth J. Mackin, Masahiro Ishii (2007), Using Mobile Computers in Sports Education (in Japanese). Tokyo University of Information Sciences Journal, Vol.10 No.1 pp.1-9