MOBILE SOFTWARE APPLICATION FOR MEASURING CARDIOVASCULAR ENDURANCE FITNESS FOR CADETS OFFICERS

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Abstract - Mobile software application has become a part of today's lifestyle. This mobile app is designed to help society to be physically active. The application is named UPNM Cardio Fitness, and is developed on the Android platform. The original purpose of the application is to measure and analyse the level of cardiovascular fitness of 20 years old cadets through a 2.4 km run test. The application is based on a data base using Google Fusion Table that stores and analyses the data received. The application consists of two parts: information of the individual and their respective fitness norms that can be accessed either automatically or manually. The classification of the norms is obtained from the fitness norms of 120 male cadets aged 20 years old. The norms are grouped into five categories which are: Excellent, Very Good, Good, Moderate and Poor. The software consists of 5 hyperlinks which are the main page, individual information, test result, file and record. The application is created using MIT App Inventor Software and Windows 7. The creation of the application has enabled researchers particularly in the Science Training programme in UPNM to carry out tests as well as to identify the level of fitness of their trainees immediately, accurately, and systematically.

Keywords: 2.4km run test, android, cadet student, cardiovascular endurance, google fusion, MIT App Inventor, mobile application, physical fitness norm, Windows 7

I. INTRODUCTION

Information Communication and Technology (ICT) revolves all aspects of technology as the medium of information dissemination such as radios, televisions, smart phones, computers and internet. Rapid advancement in ICT createsa lot of impacts in almost every aspects of life. It is used in broadcasting news, sharing educational knowledge including updates on health issues. The development in the field of technology has changed ways human being learn and work [1]. This is due to the globalisation of technology that leads it to be perpetually and continually developed throughout time. Combining the creativity and innovation of the researcher, the mobile app is introduced as something new that has never been created before. This is because technology has been used as a bridge between individual experience and existing knowledge, with new knowledge that is taught and learned through the delivery of mobile application used [2].

The development of mobile communication technology through the current application provides various alternatives to connect with people. For example, a mobile phone nowadays is no longer limited for the purpose of making calls and sending text messages through short message service (SMS) alone. Cell phones have evolved into smartphones with the addition of functions and features.. Smartphones are equipped with amenities such as sending and receiving e-mail, multimedia messaging service (MMS) which is present in the form of a mix of music, images, animated sequences and short video recording. Smartphones also have a navigation tool, high-definition cameras and many other advanced features according to the model and specification issued by companies producing smartphones [4]. Amongst the world's leading company producing smartphones are Apple, Samsung, Blackberry and Asus. In addition, users are able to surf websites provided there is a connection to the internet and utilise various applications. Wirelesscommunication facilities are also provided to enable users using multiple applications that require internet access. It is unsurprising that a smartphone is the most popular mobile devise used by nearly 2 billion people around the globe as it has helped to facilitate everyday task according to a remark made by eMarketer [5].

Based on the current development in technology, as predicted, smartphones have become an indispensable communication tool for most people, especially youngsters [6]. The prevalence of using mobile technologies especially smartphones has shown a rapid speed in the ubiquities. This is supported by the convenience of the internet infrastructure for high speed internet access and WIFI facilities installed in most buildings. People are compelled to become digital citizens by having smartphones. Apart from the infrastructures provided, mobile application tools have also played a role in the increase use of smartphones. Smartphones are not purely designed to meet basic needs such as socialising using social applications, but it is designed to be more user

friendly whereby anyone can use it despite not being IT savvy [7].

According to Kassim& Isa (2015), noted that the athletes are engaged in a process of learning, which involves important aspects interpersonal and intrapersonal skills. This is supported by Kassim&Berahim(2015), a conducive learning environment is also important, as well as giving them a reward if they achieve excellence. According to Kassim& Mokhtar (2016), physical fitness is a component that constitutes total fitness that is constantly being used in acting or in any order form of action. In addition, a person who is fit enough ables to face challenges of emergencies that may arise in the future. The above definition is supported by the study known as AAHPERD (1980),

II. RESEARCH OBJECTIVES

The objective of this research is to measure and test the cardiovascular endurance level of 18 year old UPNM male cadets using a 2.4 km run test as the instrument. The second objective of the research is to create a cardiovascular endurance fitness norms based on the 2.4 km run test battery conducted. Thirdly, the objective is to create a mobile app through Android system based on the norms obtained.

III. RESEARCH INSTRUMENT

CARDIOVASCULAR ENDURANCE FITNESS NORMS

In order for the researcher to assess the level of physical fitness of a person in a study, there should be a test that is consistent with the subject matter of the study. The physical fitness test carried out in a study is considered as an instrument. Instruments in a research for a physical fitness test must have high validity and reliability in order for the result to be precise and indisputable [12], [13]. In this study, the chosen instrument is a 2.4 km run test developed by Kenneth H. Cooper in 1968 for the US military [14]. The 2.4 km run test has high validity, r=0.92 [15] and r=0.86 [16]. After the 2.4km run test is carried out, the results are then analysed. The cardiovascular endurance fitness norms produced will then be the guideline data to build the mobile software application that uses Android as the platform. The norms are to be accessed via smartphones.

SMARTPHONE AND MOBILE APPLICATION

The smartphone is a combination of mobile phone and personal digital assistant (PDA). The mobile phone uses an operating system such as Symbian, Windows Mobile, Android, iOS, Palm, and numerous mobile softwares. It comes with internet access and is able to support multimedia applications [17]. The 2 in 1 concept used in smartphones is useful to many users especially those who are frequently engaged in outdoor activities such as attending seminars or meetings, taking data of patients, retrieving serial number in hardware store, organising daily routine, finding direction or for navigation purposes and many more. For the PDA to function, smartphones are equipped with a microprocessor and memory chips such as RAM, ROM or flash card [18].

IV. RESEARCH METHODOLOGY

CONSTRUCTION OF CARDIOVASCULAR FITNESS NORMS

The research is done through experimental observation. It is designed to use the pre-existing instrument developed by Cooper Institute. Descriptive statistics analysis through SPSS version 20 was used to calculate and interpret the data. The findings have enabled the researcher to describethe frequency, percentage, mean and standard deviation of the existing demographic variable such as sex, race, height and weight. The samples of the study are 18 year old UPNM Foundation Programme male cadets for admission in the 2013/ 2014 session. A total of 120 male cadets carried out a fitness run test of 2.4 km representing 30 percent of the total male cadets in the foundation programme [22].

APPLICATION PRODUCTION

The cardiovascular endurance norms produced are then used as the main data for the production of the mobile application. The method of production of the mobile application is using the System Development Life Cycle (SDLC) model. It is a form of a database system development cycle and operation of the software. According to [23], the SDLC model consists of 6 phases, and they are: preliminary investigation, system analysis, system design, system development, system deployment and maintenance phase. These phases are cycles for the working of a process that will identify the strength or weakness of every phase. The first phase which is the preliminary investigation phase is the phase for producers of the app to identify the problems and needs for information systems. In the first phase of this research, the producer has identified and recognised that there is still no application system created specifically in recording, saving and managing the cardiovascular endurance physical fitness test information of cadets.

The second phase is the system analysis whereby the system analyses new requirements which a specified system needs after the current system is studied in depth. This phase is the most crucial phase because developers can develop the application based only on its needs to carry out the process easily as planned. The hardware required in this study is a computer and a mouse whereas the software required is online MOT Apps Inventor and an internet connection. MIT App Inventor is used because it is done virtually in the cloud by the website

http://ai2.appinventor.mit.edu/ and does not require an installation of the app in the computer system. Problems and needs of the end users will be analysed in more detail so that the goals can be achieved.

The third phase is the application design phase. There are three main tasks in this phase, and they are: providing alternative application, choosing the best application design, and writing an application design report. The application producer will create more than one design to fulfil the need for information. Required specs from the previous phase will be studied and the application design will be prepared in this phase. The desired feature and operation will be described in detail including screen display, functions, hardware and software.

The fourth phase is the application development phase. In this phase, the application is developed using the software and hardware. The application is then put into work to test its functionality. A test typically takes about 2 weeks especially if it is complex. All feedbacks and responses are taken to ensure all procedures have worked out as planned.

The application deployment phase is the fifth phase which is the installation of the new system. End users will be taught andguided in using the application. Another name for this phase is the application conversion because there are conversion processes or changes from the older system to the new one. End users will be trained to use the new application accordingly.

The last phase is the maintenance phase whereby maintenance begins with updating the application. Evaluation is then made to see whether the application is productive and dynamic.

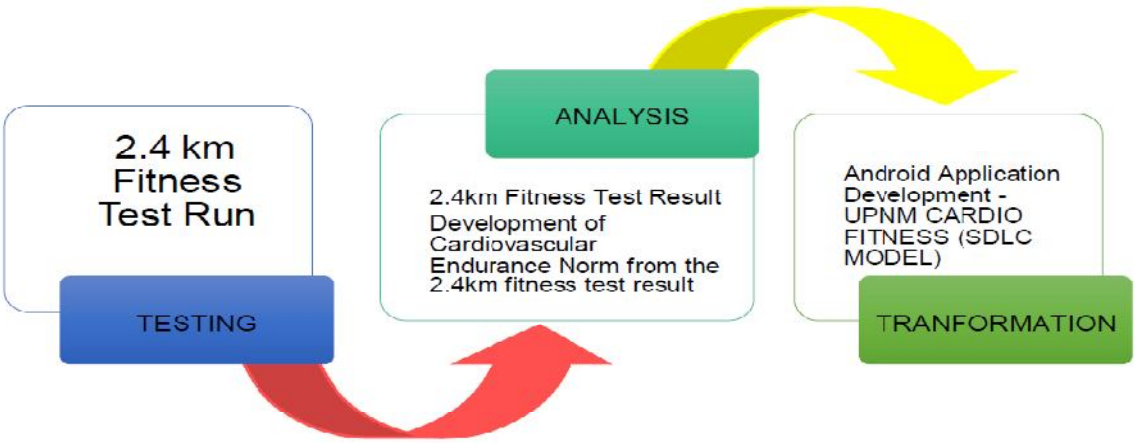

Figure 1. Research Framework

V. RESULTS

All respondents were randomly selected for this study. Descriptive statistics showed mean scores and standard deviations for all respondents involved in the 2.4 km run test (M=10.86, SD=0.91). Table 1 shows the test scores of the students in the 2.4 km run test. The minimum and maximum time recorded is 9.17 and 13.13 mins while the median and the skewness showed 11.13 and -0.036. The statistics/ data produce a bell-shaped curve to show normal distribution.

Table 1. Descriptive Statistics for UPNM Foundation Programme Male Cadets

20 Year Old Male Cadets	
Minimum	9.21
Maximum	13.30
Mean	10.8646
Median	11.1350
Std. Deviation	.91960
Skewness	-.036
18 year old Male	
N	120

Table 2 shows the test result of the norms from the 2.4 km run test conducted on the male cadets. There are 5 predefined classifications in the production of a particular grade of fitness norms, and they are: Excellent (5), Very Good (4), Moderate (3), Satisfactory (2), Poor (1). According to [12], grading a test enables a set of people to be classified according to their abilities and achievement.

Every level states the scores achieved starting from the highest to the lowest which is 5 to 1. Norms are also used by the National Physical Fitness Award Singapore (NAPFA) [24.] From the table, the highest achievement which is Excellent with the score of 5 starts from 9:40 and below, the next level is Very Good with the scores of 4 is from 9:41 to 10:40, the Good level with the score of 3 is from 10:41 to 11:31, and the satisfactory level with the score of 2 is from 11:31 to 12:24 and lastly, the Poor level with the score of 1 is from 12:25 and above.

Table 2. Cardiovascular Endurance Physical Fitness Norms for 18 Year old UPNM Foundation Programme Male Cadets

Category	Score	Duration (mm:ss)
Excellent	5	< 9:45
Very Good	4	9:46 - 10:45
Good	3	10:46 - 11:35
Satisfactory	2	11:36 - 12:30
Poor	1	12:30>

Note. (mm:ss)=(minutes:seconds)

CONCLUSION

Overall, the product of this research which is the cardiovascular endurance fitness norms for 18 year old UPNM Foundation Programme male cadets can be used as a guideline to measure the overall level of fitness for the reference of many people. With the production of the norms, the level of cardiovascular fitness norm for an 18 year old male can be assessed through the 2.4 km Run Test. The norms measures and determines the level of fitness accurately when the test is done. Generally, the fitness norms benefit a lot of people especially teenagers who fall into the age category of interest. Amongst the benefits are not only to know the level of fitness but also acts as the motivation to create a better lifestyle that is healthy and safe.Kassim (2012) stated that the important of coaches requiring knowledge in the coaching process are important to build up the quality of fitness level using the norms of physical fitness.

Hopefully, the research gives an impact to several parties which are involved in the management of sports team particularly for trainers to harness the privilege of using technology in recruiting the talents especially in sports. Therefore, it is crucial to have full understanding on the efficient training system to produce quality and planned goals for any team or athletes. Recent studies of Kassim, M. et al. (2016), states that physical fitness is when a person has the ability to perform daily tasks without fatigue with minimal energy consumption and has surplus energy to be used for more challenging activities. Consistent with the research conducted by [26] that proposed an efficient training system using fitness test procedure, it should have high potential to make it as an interesting experience to attract people involved especially youths. In addition to the technological aspect that gained attention especially the millennials who want to obtain information easily without depriving the quality of the information. The outcome of this research could be patented as the proprietary of the UPNM and also utilisedas a fitness guideline to produce fitness norms for every age and gender in Malaysia.

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