

E-Learning For Programming Languages On Android Devices

Sarah Jane Aseniero, Arlene Buena, Danny Carreon, Joanna De Luna, Ma. Erlinda Simangan, Engr. Mary Regina B. Apsay

Abstract: The main goal of this study is to be able to create E-learning software that can be a great help to IT or CS Students as well as to those people who are interested in programming by using their mobile phones, specifically, Android phones. It aims to answer if there is any significant difference between the existing webpage e-learning system and the proposed e-learning for Android devices in terms of speed, accuracy, user-friendliness, and reliability. The researchers conducted a survey in order to find out which is better between the existing webpage e-learning system and the proposed e-learning for Android devices. The researchers provided a close-ended questionnaire that would be answered by the respondents in order to evaluate the existing and proposed system presented to them. The proposed e-learning for Android devices is better than webpage e-learning system because it has additional features and more functional. It is user-friendly and easier to access. It was concluded that there is a significant difference between the existing and proposed system in terms of speed, accuracy, user-friendliness and reliability.

Index Terms: Android, E-Learning, Programming Languages, Java, HTML, Visual Basic, PHP, C, C++, Python

1 INTRODUCTION

With the fast growing of mobile technology, mobile devices are becoming ever more important due in main to their ubiquity. With the recent improvements on mobile devices, it has become more useful to people especially in terms of learning. It is now possible to develop applications for mobile phones which can support learning process. In a report by Elliott Masie (2008) entitled "Mobile Learning update), Merrill Lynch launched an initiative called GoLearn, which offered three mandated courses via BlackBerry. She stated that the result exceeded her goals. The mobile learners obtained a 12% higher completion rate in 30% less time than the control group. Collecting information can be made through computers and internet but as most people know, internet is not easily accessible everywhere. Common e-learning applications are comparable to information systems because of being textual. Hence, this research aims to improve learning with the help of mobile phones by making it more interactive, in this manner making it more accessible in addition building a well enhanced learning experience for students.

1.1 BACKGROUND OF THE STUDY

Learning is a continuous process which people can't only find in school but everywhere. As computers and the internet become essential educational tools, the technologies become more portable, affordable, effective and easy to use. E-learning requires computer and internet but most people know that not everyone have this kind of resources at home or at school. Without these resources, a learner could not succeed in learning. The proposed Mobile E-learning system contains computer programming languages that will be great of help for IT students due to mobile phones ubiquity. It is a system that can be accessed anytime and anywhere even without the use of internet.

1.2 OBJECTIVES OF THE STUDY

The study aims to develop e-learning software that can help IT students in their studies by using their mobile phones and at the same time, to make learning handy. Specifically, the study aims the following objectives:

1. To be able to create an application for mobile phones that would create content and measure results. Specifically:
 - a. To accept player's name
 - b. To display the lessons
 - c. To enable the users to take quizzes
 - d. To count the correct answers and display the result
 - e. To save the score of the user
 - f. To display high scores
2. To design a user-friendly interface.
3. To code the program for viewing of lessons, taking of quizzes, computing scores and displaying the ranking for the system.
4. To test and debug the system on different android devices.
5. To link the database to the user-interface of the application.
6. To create a database that will store data for lesson, quizzes, index and high scores.
7. To evaluate the E-learning on Android Devices for Computer Programming Languages.
8. To implement the E-learning on Android Devices for Computer Programming Languages different android devices.

-
- *Aseniero, Buena, Carreon, De Luna and Simangan are currently taking Bachelor of Science in Information Technology in Our Lady of Fatima University, Philippines.*
 - *Engr. Mary Regina B. Apsay is a member of a Faculty of College of Computer studies in Our Lady of Fatima University*
 - *Contact Numbers:*
 Aseniero-09094562188 | sarah_aseniero19@yahoo.com;
 Buena-09294984028 | buena.arlene@ymail.com
 Carreon-09057520589 | danz.carreon@yahoo.com
 De Luna-09053124554 | djoanna36@yahoo.com
 Simangan-09051926509 | erly.simangan@yahoo.com
 Apsay-09178074999 | regina_mb2001@yahoo.com

1.3 STATEMENT OF THE PROBLEM

This study sought to answer the following:

1. How do the respondents evaluate the existing webpage e-learning system in terms of?
 - 1.1. Speed
 - 1.2. Accuracy
 - 1.3. User Friendliness
 - 1.4. Reliability
2. How do the respondents evaluate the proposed e-learning for Android devices In terms of?
 - 2.1. Speed
 - 2.2. Accuracy
 - 2.3. User Friendliness
 - 2.4. Reliability
3. Is there any significant difference between the existing webpage e-learning system and the proposed e-learning for Android devices in terms of?
 - 3.1. Speed
 - 3.2. Accuracy
 - 3.3. User Friendliness
 - 3.4. Reliability

1.4 HYPOTHESES

There is no significant difference between the Web-based E-learning System and E-learning on Android Devices for Computer Programming Languages in terms of:

1. Accuracy
2. Reliability
3. Speed
4. User-friendliness

1.5 SCOPE AND LIMITATIONS

The E-learning on Android Devices for Computer Programming Languages is a mobile application which consists of information about the different programming languages. It is an information system with additional features. The user can take quizzes, choose difficulty levels and input their names for ranking purposes once the scores are tallied. The application runs on an Android Gingerbread OS and lower versions. Basically, it will be a great help for IT students and even professors as well as those out of the school youths who can't afford to study to school. The application is downloadable for free. The application will not run if the user doesn't use an Android phone. The file is not transferrable through Bluetooth but it can be downloaded for free on different hosting sites like 4shared.com. The system is purely consisted of information and the user can't run a program. It also doesn't support linking features. The application doesn't support lookup table. Though the application is open to everyone, the application will be very not suitable for kids as well as those people who don't have interest on programming. Adding of other programming languages is not allowed.

1.6 SIGNIFICANCE OF THE STUDY

The development of the proposed system is intended to enrich and upgrade the way of learning of IT related studies by developing a based-module program for students to enhance their knowledge through mobile. This study will be beneficiary to the following:

Students. It will give the students useful and handy information about programming languages, that would convey their concerns regarding to the topics using their mobile phones, anytime and everywhere while providing them enjoyment in the process.

Professors. It can be use as a teaching guide and will contribute to improve and strengthen their academic competence in more convenient way.

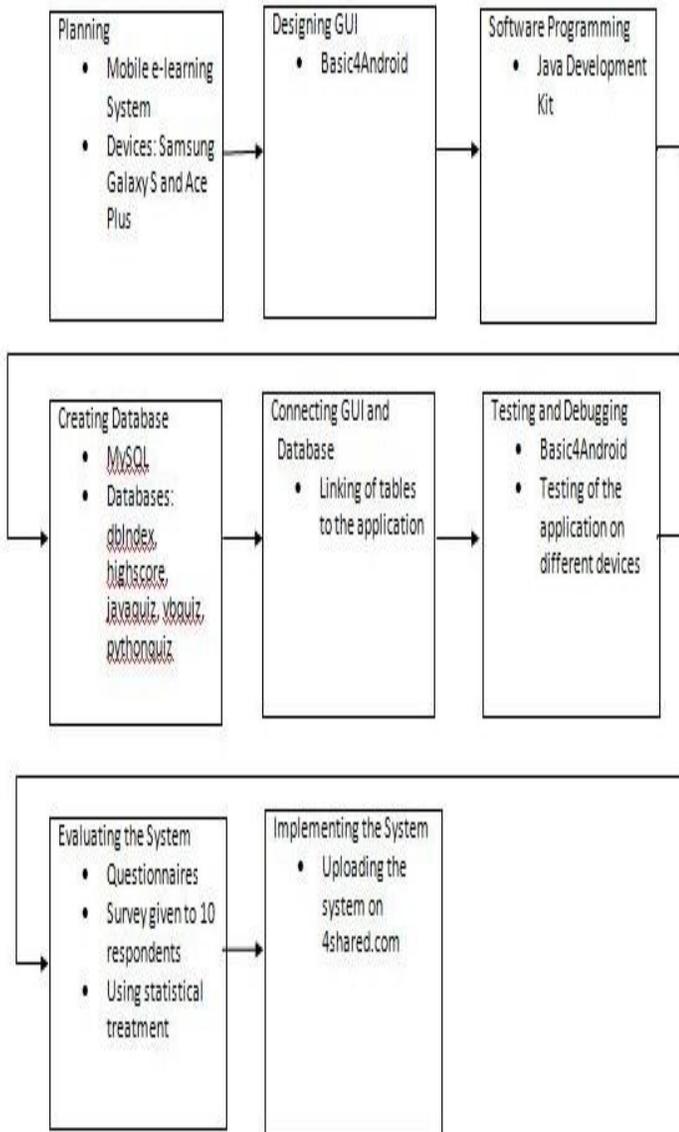
Out of school youths. It will serve as an informative medium for people who can't afford to go to school but very eager to learn.

1.7 DEFINITION OF TERMS

1. Android virtual emulator(AVD)- software use to virtualized the program in a computer
2. Android- The operating system that the researchers will used in developing the application.
3. Android phone-A device that the researchers will use in testing and implementing the software.
4. Application Programming Interface – a software components that the researchers will use in communicating with each other
5. .apk- the system file extension name
6. Basic4Android- software tools for developing android applications.
7. Eclipse- A tool that the researchers will used in developing the said application.
8. E-Learning- learning and teaching through the use of computer devices.
9. Graphical User Interface (GUI) -the proposed system's interface design
10. Gingerbread- The version of android that the researchers will use for the application.
11. Hosting sites – websites where the application will be uploaded like 4shared.com
12. Index - will serve as a dictionary for important terms.
13. Java Development kit – software that the researchers will use to code the program.
14. Library- serve as temporary storage of data
15. Mobile Application – a software that the researchers designed to run in an android phones.
16. Mobile e-learning- the system that the researchers will develop.
17. module-separate unit of hardware or software
18. My sql- a software that the researchers used in creating the database of the system.
19. Programming Languages- are the topics or content of the application.
20. Software Development Kit- the software that the researchers will use to develop android applications.

2 METHODOLOGY

2.1 RESEARCH DESIGN



Show in Figure 2 is the research design used by the researchers to finish their proposed system which has a total of 8 categories. The researchers developed a mobile E-learning system that can help IT/CS students with their studies with the use of mobile phones. The devices used by the researchers were Samsung Galaxy S and Ace Plus. There are 7 lessons included. There are available quizzes per subject with 3 difficulty levels. The questions in the quizzes are randomized. The researchers developed a program which specifically accept player's name, displays lessons, enable users to take quizzes, count the correct answers and display the result, save the score of the user, and displays high scores.

2.2 RESEARCH SETTING

The research was conducted at Our Lady of Fatima University. The first assessment of the research was on July 2012 when the researchers proposed their system. The second assessment was on September 2012 when the researchers

presented 50% of their proposed system. The third assessment was on October 2012 when the researchers presented 80% of their proposed system.

2.3 RESEARCH SUBJECT

The researchers let some IT/CS students use the system and then let them evaluate and give suggestions for the system. To get the sample size for the respondents, the researchers used the Slovene's formula which is shown below:

2.4 RESEARCH INSTRUMENT

The instruments used in the research are different devices. The researchers used a desktop computer in order to create the application. They also used Android devices for the testing and debugging of the e-learning system. To be specific the researchers used smartphones namely – Samsung Galaxy S and Samsung Galaxy Ace Plus.

2.5 METHOD OF RESEARCH USED

2.5.1 VALIDATION OF INSTRUMENT

First, the researchers created a questionnaire to gather evaluation of the existing and proposed system. After creating the questionnaire, they had it checked and corrected by a statistician. After getting the approval of the statistician, they made a letter addressed to the dean of Our Lady of Fatima University, the research setting, asking permission to conduct a survey on several students. Only after getting permission from the dean did the researchers conducted the survey.

2.5.2 DATA GATHERING PROCEDURE

The data for this research were collected using a survey questionnaire. The survey was created using suitable questions modified from individual questions formed by the researcher. The survey was comprised of 4 categories with 3 questions each which were related to the participant's opinion about the e-learning system. Since it is a close-ended questionnaire, the researchers used the Likert scale in formulating choices.

2.5.3 STATISTICAL TREATMENT

The proponents will use the following formulas in order to analyze and interpret the collected data.

$$1. \text{ Mean } (m) = F (X_1+X_2...X_n)$$

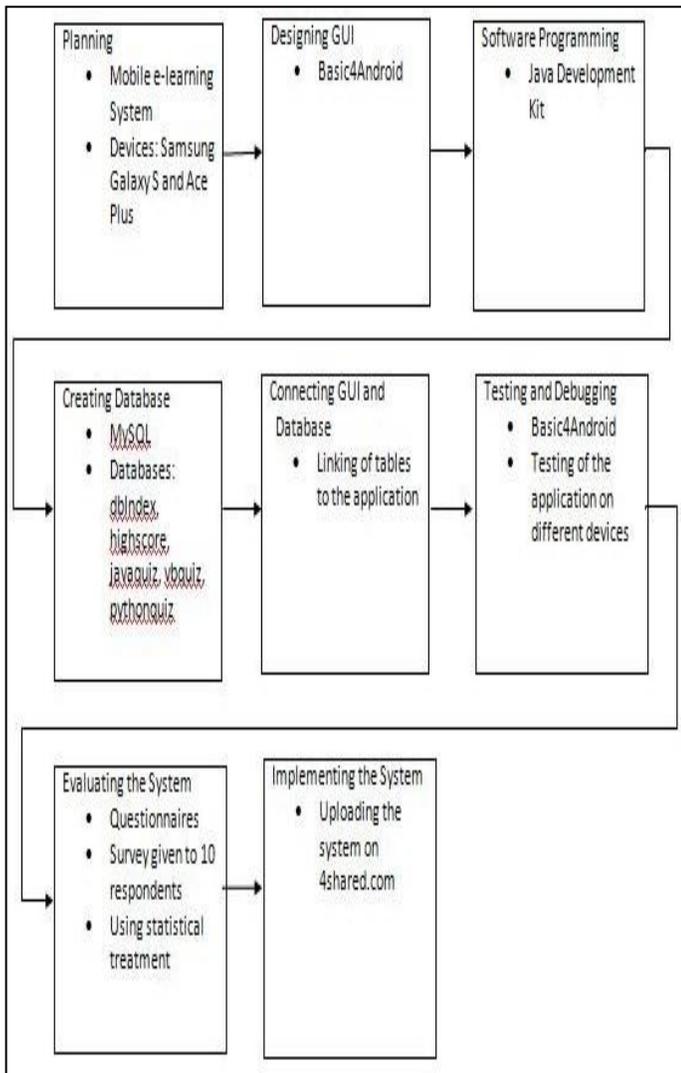
Where:

F = Frequency
X = Respondents

$$2. \text{ Weighted Mean } (WM) = \frac{\sum f (X_1+X_2...X_n)}{N}$$

Where:

N = total number of criteria
 $\sum ME^2$ = represents the total numerical value of the squared mean of the existing system



3. Percentage = $\frac{n}{N} \times 100\%$

Where:

n = number of respondents
 N = overall number of respondents

4. Z-test (z) = $u - \frac{n_1 n_2}{2} \cdot \frac{\sqrt{n_1 n_2 (n_1 + n_2 + 1)}}{\sqrt{12}}$

Where:

n₁ = number of respondents for the existing system
 n₂ = number of respondents for the proposed system

3 PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

The researchers tallied the results that were gathered from the questionnaire which were distributed, and interpreted.

Category	Mean	Interpretation
Speed	2.64	Fair
Accuracy	0.13	Not Existing
User-Friendliness	2.55	Fair
Reliability	0.88	Needs Improvement
Overall	1.55	Fair

Total Mean of the Existing System

Table ____ shows that the existing system, Webpage E-learning System is Fair. The existing system is fair in terms of speed, with a mean of 2.64, and not existing in terms of accuracy with a mean of 0.13. In terms of user-friendliness, the existing system is fair, with a mean of 2.55 and needs improvement in terms of reliability, with a mean of 0.88.

Category	Mean	Interpretation
Speed	4.62	Excellent
Accuracy	4.55	Excellent
User-Friendliness	4.42	Good
Reliability	4.57	Excellent
Overall	4.54	Excellent

Total Mean of the Proposed System

Table ____ shows that the proposed system, E-learning on Android Devices for Computer Programming Languages is excellent. The proposed system is excellent in terms of speed, with a mean of 4.62, and accuracy with a mean of 4.55. In terms of user-friendliness, the proposed system is good, with a mean of 4.42, and excellent in terms of reliability, with a mean of 4.57.

Category	Existing System	Proposed System
Speed	2.64	4.62
Accuracy	0.13	4.55
User-Friendliness	2.55	4.42
Reliability	0.88	4.57
Overall	1.55	4.54

Differences of Mean of the Existing and Proposed System

According to the result of the study, the proposed system, E-learning on Android Devices for Computer Programming Languages, is better than the existing system, Webpage E-learning System in terms of speed, accuracy, user-friendliness and reliability.

Criteria	Z-Score	Critical Value	Decision	Interpretation
Speed	-8.58	± 1.96	Reject H_0	There is a significant difference between the existing and proposed system in terms of speed.
Accuracy	-8.87	± 1.96	Reject H_0	There is a significant difference between the existing and proposed system in terms of accuracy.
User-Friendliness	-8.59	± 1.96	Reject H_0	There is a significant difference between the existing and proposed system in terms of user-friendliness.
Reliability	-8.87	± 1.96	Reject H_0	There is a significant difference between the existing and proposed system in terms of reliability.

Computing of the Z-Score

Table _____ shows that there is a significant difference between the proposed system, E-learning on Android Devices for Computer Programming Languages and the existing system, Webpage E-learning System in terms of speed, accuracy, user-friendliness and reliability.

4 SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

4.1 SUMMARY OF FINDINGS

From the yielded instruments, the researchers summarized the following: The Existing System, Webpage E-learning System is Fair. The existing system is fair in terms of speed, with a weighted mean of 2.64, and not existing in terms of accuracy with a weighted mean of 0.13. In terms of user-friendliness,

the existing system is fair, with a weighted mean of 2.55 and needs improvement in terms of reliability, with a weighted mean of 0.88. The Proposed System, E-learning on Android Devices for Computer Programming Languages is excellent. The proposed system is excellent in terms of speed, with a weighted mean of 4.62, and accuracy with a weighted mean of 4.55, In terms of user-friendliness, the proposed system is good, with a weighted mean of 4.42, and excellent in terms of reliability, with a weighted mean of 4.57.

4.2 CONCLUSIONS

Through this research, the researchers were able to develop e-learning software that can help IT students in their studies by using their mobile phones and made e-learning handy. Specifically, it can be concluded that the researchers were able to create an application for mobile phones that had created content and measured results. They were able to design a user-friendly interface and coded a program for viewing of lessons, taking of quizzes, computing scores and displaying high scores. They were able to test and debug the system on different android devices and were able to create a database that will store different datum and linked it to the user-interface of the application. It can also be concluded that the respondents' evaluation for the existing system in terms of speed was fair; accuracy did not exist; user-friendliness was fair; and reliability needs improvement. However, the respondents' evaluation for the proposed system in terms of speed was excellent; accuracy was excellent; user-friendliness was good; and reliability was excellent. Therefore, the researchers therefore conclude that there is a significant difference between the existing and proposed system in terms of speed, accuracy, user-friendliness and reliability.

4.3 ACKNOWLEDGMENT

The authors would like to express their deepest gratitude to those people who had helped them all throughout the process of completing this study. First of all, they would like to thank the College Dean of Arts and Sciences, Dr. Ramonita Salazar for allowing them to conduct their survey in the school as well as using the facilities. They would also like to thank the panelists, for their suggestions for the betterment of the result of this study. They would also like to take this opportunity to thank, Fruzzel Paul Dianzen, for helping and guiding them in making our software. The authors are very thankful and grateful to those people, who have directly and indirectly lent their hands to them for the completion of this study.

4.4 REFERENCES

- [1] Chun, D. (2010) A reflection on the state Mobile learning in asia and a conceptual framework
- [2] Espiritu, J.L (2009) Opportunities and Barriers for Mobile Learning in the philippines
- [3] Hashim, A. (2007). Mobile Technology for Learning Java Programming - Design and Implementation of a Programming Tool for VISCOS Mobile
- [4] Hosseini, A. (2005). Mobile Learning Network
- [5] Hutchison M., Tin T., Cao Y.(2008): Chapter 8:'In-Your-Pocket' and 'On-The-Fly:Meeting the

needs of today's new generation of online learners with mobile learning technology

Students' Attitude and Academic Performance

- [6] Johnson, M. (2011) XML for the absolute Beginner
- [7] Kreibich (2010) Using SQLite
- [8] Magtira, M.C (2011) Diwa embarks on mobile e-learning with tablet Pc
- [9] Mirri, S. (2007). Rich Media Content Adaptation in E-Learning System Servers
- [10] O'neil, S., Bernan, M. (2011) The benefits and pain of enterprise mobility
- [11] Ovum. (2011) Computer World Smartphone's to rule in 2011
- [12] Ullman, (2006) MySQL:Visual Quickstart Guide
- [13] Vogel, L. (2012) Android Development Tutorial
- [14] Vogel, L. (2012) Eclipse IDE Tutorial
- [15] Woodwill, G. (2006) The Mobile Learning Edge
- [16] Arimbuyutan R., Kim S., Song J., and So W. (2007). A Study on e-Learning for Philippines
- [17] Yang Y., Tan W., Lin S., Zhao X., and Yang F. (2008) An Overview on Mobile E-Learning Research of Domestic and Foreign
- [18] Kampana, S., Tsohis D., and Tsakalidis, A. (2011) Student Perceptions of Mobile Learning: A Review of Current Research
- [19] Kampana, Tsohis, and Tsakalidis (2011) A Case Study Of An Adaptive & Personalized Mobile e-Learning
- [20] Najmi, A. & Lee, J. (2009) Why and How Mobile Learning Can Make a Difference in the K-16 Classroom?
- [21] Arancillo, Wallen Mae, Arlanza, E.M., Blancaflor, J.A.M. and Guardafado, M.J. (2012) MOBILEARN: An E-learning Portal for 3G handheld Devices
- [22] Barsobia M., Pelayo R., and Smatra A. (2006) Accessing Information via Mobile Phones Among Computer Science Student of Our Lady of Fatima University. Lagro Campus
- [23] Comon J, Gerona M., Jurilla M. (2009) Video Conferencing and Online Learning for the Students in HTML
- [24] Gano L, Delloso L. (2007) The Effects Of Online Module-Based E-Learning Approach On College

- [25] Melinda dP. Bandalaria (2005) Education for All Through the Mobile Phone: The University of the Philippines Open University Experience