Global Conferences Series:
Sciences and Technology
Volume 2, 2019

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Developing Android-Based Semester Examination Applications for Vocational High School

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Abstract. This research is conducted for developing android-based semester examination applications named "Flyexam" and "FlyExambrow" which can be accessed through Android mobile phone. The purpose of this research is to create integrated applications which shall support computer-based semester examination for the students of Vocational High Schools, they are one server application and one Android-Based Client Application, both shall be developed in such a way so as to be valid and practical. The research applies Research and Development (R&D) method by adopting 4D model, namely Define, Design, Develop, and Disseminate. Two experts in media application and two experts in web-based application shall examine the validity of the applications. The prospective users of the applications, namely the students and the teachers of Vocational High Schools shall be involved in the trial of the applications and in filling-in relevant questioners so as to know the practical value of the applications. Results of the research showed that the applications are considered valid with 89% validity score and 83% practicality score. Therefore, it can be concluded that this Android-Based Semester Examination Applications are valid and practical for use.

Keywords: fly exam, flay exam brow and android.

1. Introduction

Organizing a Final Semester Examination in Vocational High Schools (*SMK*) used to be rather time consuming, particularly those with regard to vocational/practical competency tests for skills assessment. For example, testing 3 to 5 subjects for each skill level and competency takes about 1 week, followed by examination for 8 to 11 subjects to measure knowledge in general subjects, which also takes about 1 week. In total, a final semester examination for Vocational Schools takes about 2 weeks in average. Such a length of time for the final semester examination for Vocational Schools must be costly, and conducting the examinations in such a way contains some weaknesses, among others related to: 1) Provisioning of examination materials: paper, copy of the question script, honorarium for making the question script, etc. 2) Provisioning of honorarium for the exam watch team and organizer of the exam. 3) Provisioning of consumption for the exam watch team and organizer of the exam. 4) Provisioning of papers and other stationery. 5) Checking of examination results which takes a quite long time. 6) Possibility of the element of subjectivity from the examiners

7) Possibility of cheating among the students. 8) Provisioning of lots of class rooms. 9) Involvement of many parties in conducting the exam.

Some of the weaknesses above affect the school budget. The amount of costs for administering the semester exam at Vocational High Schools reduce the financing posts of other activities in the school, such as funding for improving the quality of human resources, procurement and improvement of other learning support facilities and infrastructure. In order for the funding of other activities in the school to be carried out, efficiency needs to be done. One of the efficiency that can be done is by utilizing computers and gadgets/mobile phones for students in holding semester examinations.

The use of computers for carrying out examinations began in the early 1970s [1]. At that time the capability of computers was still very limited and needed high funding [2], so that its use was still very limited. With the advent of new technology, computerized exams have begun to be developed and implemented in large-scale testing programs such as licensing, certification, acceptance,anpsychological testing [3]. There are a large number of studies that find advantages for computer-based testing in various aspects compared to paper-pencil tests [4]; [5]; [6]; [7]; [8]. In one study it was found that students had a positive attitude [9] and positive learning motivation [8] against computer-based tests when compared to paper-based test. Other studies on graduate students reported that 61.8% preferred computer-based tests rather than paper-based tests [10].

The rapid development of mobile phone technology makes the capability of a mobile phone can match a computer. A mobile phone has lots of storage capacity, internal memory and bigger external memory, processor speed (CPU), wireless network connectivity (such as Wi-Fi and Bluetooth), built-in sensors, GPS, camera and operating system, all of which are fully integrated in a mobile phone. Mobile phone technology makes it possible to run small computer programs (cellular applications), which provide lots of features, including viewing and editing text files in different formats such as word and pdf, instant graphics, web browsers, dictionaries, scientific calculators and so on. If used positively, mobile phone is a good learning tool [11].

The use of mobile phone for carrying out semester exams in the author's opinion is feasible, it is practicable as a substitute for both paper-based exam and computer-based exam. Some of the factors that support the author's opinion are: 1) The level of ownership of the device among the students.; 2) According to a survey conducted by the author to the students of SMK Negeri 1 Lahat in May of 2018, there were 680 students from 972 students (70%) having an Android Mobile; 3) Mobile phone can run a browser that is able to access applications created on a server; 4) Mobile phone can be programmed to limit user access to the device, which is a feature that is needed for the security of the implementation of the exam; 5) The use of Android-based mobile phone in education has been massive. It may replace the role of computers in accessing learning contents and in implementing independent learning evaluation.

The data presented above show that using mobile phone in school examinations, especially in Vocational High Schools, is more beneficial and efficient than using paper and computers. Relevant to this condition, [2] made comparison between computer-based exams and paper-based exams, and found that both of the exam systems have almost no significant influence on the validity and overall reliability of the tests. The same thing was done by [12] tested students' attitudes towards computer-based CBT tests at Ilorin University, Nigeria. [13]. Analysis of the exam before and after motivation showed a more positive orientation of student motivation towards computers and mobile devices as a medium for delivering assessment. [9] also made a research aimed comparing the effects of computer-based learning and traditional methods on student attitudes and achievements in analytical chemistry.

2.   Research methods

This research applies a development research method by adopting Four-D development model consisting of four stages of development, namely Define, Design, Develop, and Disseminate [14]. The

end result of the development shall be 2 products, namely a web-based exam interface and a client application for Android phones. The stages being taken are: 1) Define, At this stage, all functions of the FlyExam and FlyExambrow applications shall be learned, and all files that are related to system functions shall be recorded. There are 3 important parts of application folders namely admin, public and shared; 2) Design, At this stage, the design is prepared as follows: Exam interface and FlyExam design; 3) Develop, At this stage program codes are written for creating the interface of the examination and the client application. The application is limitedly tested to check the functions and security of the applications; 4) Disseminate, At this stage the application is launched with the purpose of making it completely free of errors and for asking for input from users. The applications are given free and promoted through YouTube channels and Whatsapp groups.

2.1 Research Instruments
The instruments being used in this research are validity sheet to be filled in by the validators, and practicality questionnaire to be filled out by students.

2.2 Method of Data Analysis
The methods used for data analysis are as follows:

2.2.1 Validity Analysis
Validity analysis of FlyExam and FlyExambrow applications applies the following percentage formula as follows:

$$\text{Validity Score} = \frac{\text{Number of score obtained}}{\text{highest score}} \times 100\,\% \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Criteria of validity score according to the [15] seen in Table 2 hereunder:

Table 2. Criteria of Validity Score

Level of Achievement	Category
< 51	Poor
51 – 70	Fair
71 – 90	Good
91 – 100	Very Good

2.2.2 Practicality Analysis
Analysis of the practicality of the FlyExambrow is applied by using the following formula:

$$\text{Practicality Score} = \frac{\text{Number of score obtained}}{\text{highest score}} \times 100\,\% \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

After percentage of the practicality score is obtained, the researchers categorized such results in accordance with the scale developed by [16] as seen in table 3.

Table 3: Score of the Answers under Purwanto Scale

No	Level of Achievement	Category
1	90% – 100%	Very Good
2	80% – 89%	Good
3	65% – 79%	Fair
4	55% – 64%	Poor
5	0 – 54%	Very Poor

3. Research results and discussion

3.1 Exam Interface for Android and Computer-Based Exams

From the development created the interface for computer-based exam. The web page which is easily mobile phone as show in

having been made, it has been Android-based exam and exam interface is in the form of a accessible by the examinees using Figure 1.

Figure 1. Login Page

Figure 1 shows the login page of the administrator and the examinees for them to be able to proceed to the next menu. The username box should be filled-in with the name of the administrator or the Student Identification Number (NIS) of the examinees so as to display all the activities available in the Flyexam, and the characters consisting of is for making sure of unauthorized parties.

password is filled with 6 combined letters, numbers and symbols, this preventing illegal tracking by

Figure 2. Sample of Subjects in FlyExam

3.2 FlyExam Mobile Application

FlyExambro is an mobile phones or tablets web pages available in

application made specifically for with Android OS for accessing the the server. This application to some

extent shall restrict the users to access any other things outside the exam application with due observance of the existing security standards. The following is the display of the results of the development having been made:

Figure 4. Names of Student Registered with the Application

Figure 2 shows one of the subjects in Vocational High School 1 Lahat which has already been listed in the FlyExam Application. For conducting a mid semester exam, the first step is fixing the time and duration of the examination. After that the students may participate in the exam by strictly observing the time limit having been set.

Figure 5. Sample of Question in Arabic Language Subject

Token confirmation as providing security for application system. Each number first before shown in **Figure 3** is aimed at this Android-based exam examinee must enter the token answering the question. The token number for each examinee is different. After the token number has been confirmed, the name of the examinee will appear as shown in figure 4.

After filling in the token number in the application, the student is considered to have been registered as an examinee in the mid semester examination, and must comply with the schedule as shown in **Figure 4.** If the student clicks Confirmation & Start button then the examination shall be started and the questions for the Subjects shall appear and must be answered by the examinee, as shown in Figure5.

Form of questions provided in the fly Exam brow application mostly multiple choice questions in which the questions have been validated by relevant teachers of the subjects so that they have met the criteria to be put in an examination.

3.3 Application Validity

From the results of questionnaire filled-in by the validators, the following data as shown in Table 4 has been obtained, which is the average score given by the experts in total.

Table 4. Expert Validation

Testing Variables	Level of Achievement	Remark
Substances of Materials for Exam Application	85	Good
Visual Communication Display	87	Good
Design	86	Good
Utilization of Software	96	Very Good

From the data presented in the Table above, it can be seen that in average all indicators for evaluating FlyExam and FlyExambrow application programs are considered as being in valid category, while the usage of the software is in a very valid category.

3.4 Practicality of Application

Practical analysis on flyexam and flyexambrow application programs was carried out by giving research questionnaires filled-in by 3 teachers in Computer and Network Engineering Competency and 2 teachers in Software Engineering Competency as well as 565 students. The results of data processing from the answers of the students and the teachers are as presented in Table 5.

Table 5. Average Scores on the Answers of Students & Teachers

Variables	% Score by Students	Category	% Score by Teachers	Category
Students' Interest	76.77	Fairly Practical	81.14	Practical
Process of Using	83.02	Practical	82.50	Practical
Increase of active learners	85.57	Practical	76.00	Fairly Practical
Evaluation	93.45	Very Practical	81.00	Practical
Sufficiency of Time	86.80	Practical	84.66	Practical

Table 5 shows that the applications having been used by the teachers and the students are very practical with regard to the quality of the output, while for the quality of exam security the application are categorized as practical. For the quality of the display design and ease of use, the applications are quite practical.

4. Discussion

With regard to the findings of this research at the time of organizing the exam from the point of view of Local Area Network design, the following important matters have been noted, as follows: Initially the IP Address setting on DHCP (Dynamic Host Configuration Protocol) Server for Network A (Figure 6) that uses Android mobile phone client, class C addresser is used which is 192.168.0.0/24, the maximum number of hosts is 254. The first session exam is smooth, but in the second session many students could not take the exam. Results of the investigation found that the clients were unable to obtain the IP Address from the DHCP server. The temporary presumption for such condition is that the DHCP server was running out of IP Address to be given to the clients. While 1 exam session consisted of 180 clients, in the second session the number of clients had reached 360, meanwhile the address allocated by the server was only 254 addresses. Thus 360 - 254 = 106 clients failed to get the IP Address, therefore restarting the DHCP server was necessary.

5. Conclusion

This study produced two products in the form of semester exam application programs, namely FlyExam which was installed on the server, and FlyExambrow application for clients using Android mobile phones. Both of these application programs are declared valid with average values of 89% and 83% with practical categories, so that this application program can be used for semester examinations of vocational high school students (SMK).

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