

## Development of Android Based Try Out Application For National Exam Of Vocational Theory In Vocational School Accompanied With Learning Outcomes Recommendation

**Muklis Eko Apriyanto**

Informatics Education Department, Faculty of Teacher Training and Education,  
Universitas Sebelas Maret, Surakarta  
muklisea@gmail.com

**Rosihan Ari Yuana**

Informatics Education Department, Faculty of  
Teacher Training and Education,  
Universitas Sebelas Maret, Surakarta

**Mintasih Indriayu**

Informatics Education Department, Faculty of  
Teacher Training and Education,  
Universitas Sebelas Maret, Surakarta

### Abstract:

This research aims to know how to develop the Android based try out application for National Exam of Vocational Theory in Vocational High School of Computer Network Engineering. This application also gives recommendation according the tryout result. This research also aims to know the feasibility of this application based on an assessment by media expert and student of TKJ department. This research use research and development method (R&D) which adapted from Waterfall software development model. Waterfall method includes 5 stages: (1) requirement definition; (2) system and software design; (3) implementation and unit testing; (4) integration and unit testing; (5) operation and maintenance. The assessment results from media experts has score of 4.37 for Android-based front-end applications and for 4.42 for web-based back-end applications. Based on the assessment result for back-end application get score 4.65. Further more based on the assessment of from student as end users this application get score 4,53. It can be concluded that the Android applications is feasible to be used. This application has several advantages which are: 1) it can display the recommendation of exam results; 2) it displays questions randomly; 3) it can run on old Android version.

**Keywords:** national exam, tryout, Android, Intel XDK, SMK TKJ

## Introduction

The development of technology and information very rapidly influences people's lifestyles. One of the changes is the number of Android-based smartphone use in Indonesia. In a study conducted by DI Marketing (2016) student age in Indonesia use smartphones to play social media, chat, or just to play games. The Android device actually can be used by students for other activities such as learning a language or math. Based on UU No. 20 of 2003, National examination is one of the efforts to control the quality of education.

In the field of education, the utilization of technology can be seen in the use of computer-based national exams. To improve the results of the National Exam (UN), school usually hold the exam tryout to prepare the students to facing the National Exam, this try out is also held to predict UN result. Nashirah Dian (2009) states that Tryout is a mechanism used as an exercise for students before carrying out the real test. Based on observations at SMK N 9 Surakarta tryout of National Exam is implemented 3 times in writing and the tryout results submitted to the students in the form of the final value of the exam. otherwise, UN is conducted online-based, so try out is less to give an idea to students in doing the online based exam. Try out which is done 3 times is not enough for the student to practice in facing of UN, and the result of tryout which is implemented need to give a recommendation to get better result in UN. Ghuftron (2012) also developed online exam system in SMP Muhammadiyah 2 Godean. Based on his research, the implementation of online exam system is more effective and efficient, it also facilitates teachers in the administration process and assessment. research by Martono K.T., Nurhayati O. D. (2014) showed that Android-based learning media is easy to use by students, and it can be used anytime and anywhere. Another study conducted by Ruswanto (2014) has a result that by using the application can know the ability of students in doing national exam. The existing application only displays the test results, without giving a feedback of the exam results to the students. By using the technology advances the application can be developed with enhanced some national exam simulators in mobile version for vocational theory in SMK. So, this research developed android application by using hybrid application such as Intel XDK. The research that has been done by More K. A., Chandaran P. (2016) explained that using hybrid application will make its easy to develop in many platform. This application also using MySQL database, Nugroho (2005) describe MySQL is a database server program that can receive and sent multiuser data's rapidly and use standard language for SQL.

## Research Objective

This research objectives is to know how to develop Android based try out application for National Exam of Vocational Theory in Vocational High School of Computer Network Engineering and also aims to know the feasibility of this application.

## Research Method

This research method is research and development (R&D) which use Waterfall model development (Sommerville: 2011) it covers 4 stages which are requirement analysis, application design, implementation and unit testing, integration and application testing.

## Requirement Analysis

In this level, all of the requirements are collected and then analyzed its and defined the requirements that must be fulfilled by the program. Requirement analysis which is conducted includes functional analysis and non-functional.

## Application Design

The application design is the stage after that can be done when the requirements are completely collected. At this stage, designing some parts of application development references such as: use case design, DFD, ERD, database design, interface design can be done.

## Implementation and Unit Testing

The application design that have been made is translated into codes by using a programming language. The application will be developed using the MYSQL database, and Apache as a web server.

## Integration and Testing

Units program are fully integrated and then tested completely. Application testing uses Alfa technique which is a black box testing and tested by media expert. Beta testing is tested by the end user.

## Operation and Repair

In this stage, the completed apps which have been developed and tested will get feedback from the end-user of the app. The feedback gathered from the end-user can be used as application evaluation to improve the application quality.

## Results and Discussion

### Requirement Analysis

The requirement analysis aims to find out what kind of technology needs to be applied, which hardware and software are needed, and the main function of the application must be defined.

- 1) Functional Requirements Analysis At this stage must be defined the functions that must be in the application. The application developed has several functions including an administrator can managing the exam questions and content outline of exam on the application, the application can displaying some packages about the exam, the application is capable to display the questions randomly, the application is capable to display the results of the test and the recommendation based on the learning result, giving chance to the end user to do try out over and over without any restrictions.
- 2) Non-functional Requirements Analysis The results of a non-functional requirements analysis are divided into hardware and software requirements. Hardware requirement in the form of laptop / Personal Computer (PC) which have the specification of Intel Core™ i5-2410M processor CPU @ 2.30GHz × 4, 6GB RAM and 500 GB storage. While the software requirements are operating system ubuntu 12.04, Apache 2.410, MySQL, PhpMyAdmin 4.2.11, Bluefish 2.2.2, Inkscape, Intel XDK and browsers such as Google Chrome or Firefox.

### The Application Design

The application design is used to describe the flow of development of the application. The design consists of: use case diagram, DFD (Data Flow Diagram), ERD (Entity Relationship Diagram), interface design, and database design.

#### 1) Use Case Diagram

Use case diagram design is shown in Figure 1. The making of use case intend to manage the privileges easily.

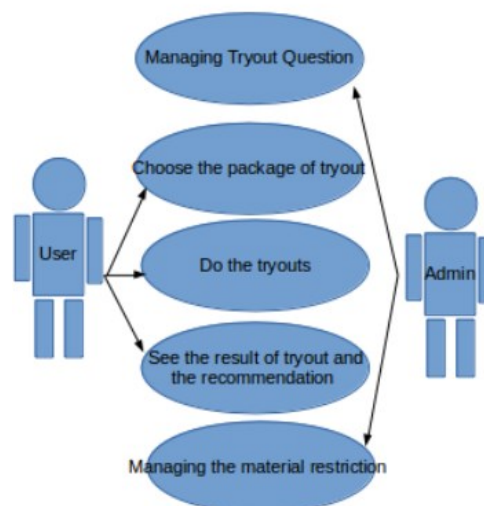


Figure 1. Use case diagram

2) DFD Design

The DFD level 0 design is showed in Figure 2. DFD level 0 shows the relation between users with the system.

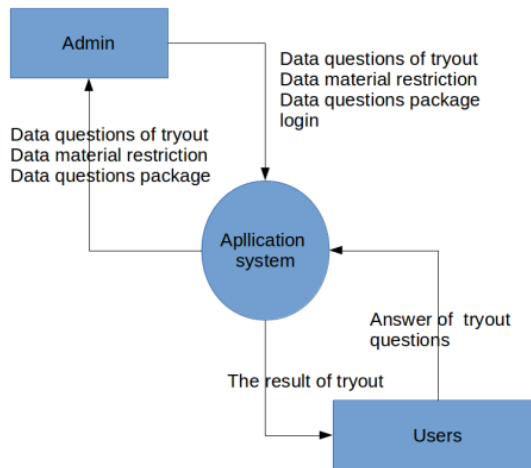


Figure 2. DFD level 0

The DFD level 1 design is showed in Figure 3. The process in DFD level 1 will be described in level 2 DFD.

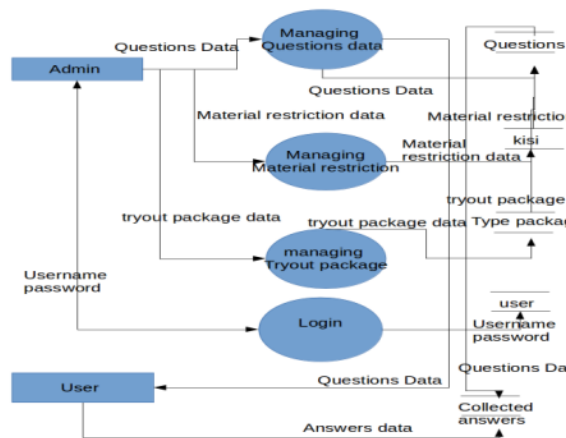


Figure 3. DFD level 1

The DFD Level 2 describes the management of questions, it is showed in Figure 4. DFD level 2 The question management explains the questions management process performed by the user.

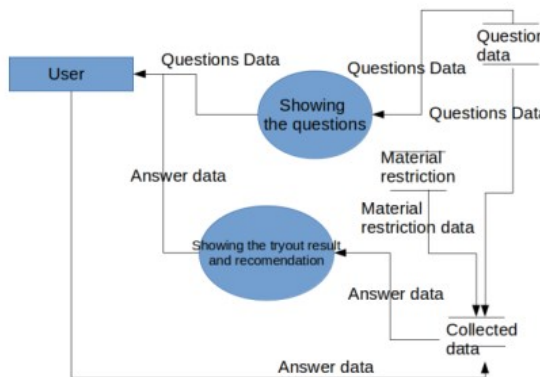


Figure 4. DFD level 2 answering question

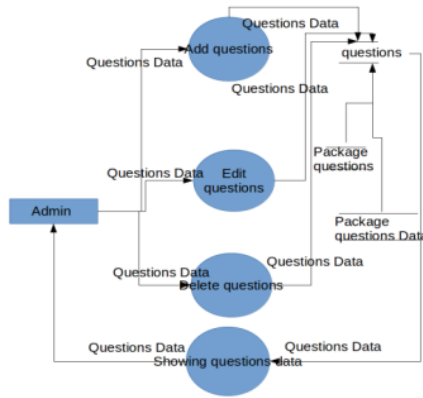


Figure 5 DFD level 2 question management

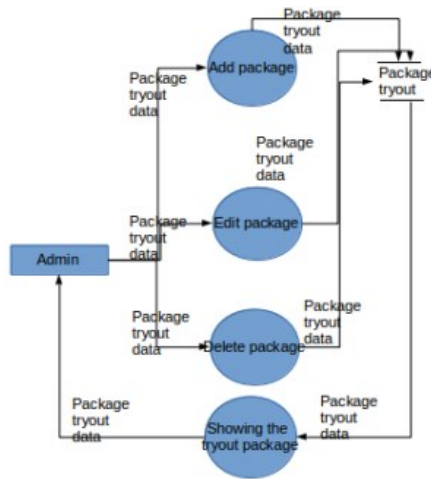


Figure 6. DFD level 2 Package Management

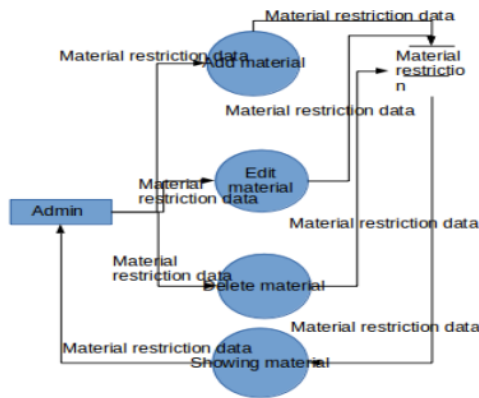


Figure 7. DFD level 2 Material Outline Management



Figure 8.DFD level 2 login

3) ERD Design

The ERD design is showed in Figure 9. The ERD design is present the relation between all of entity in the system.

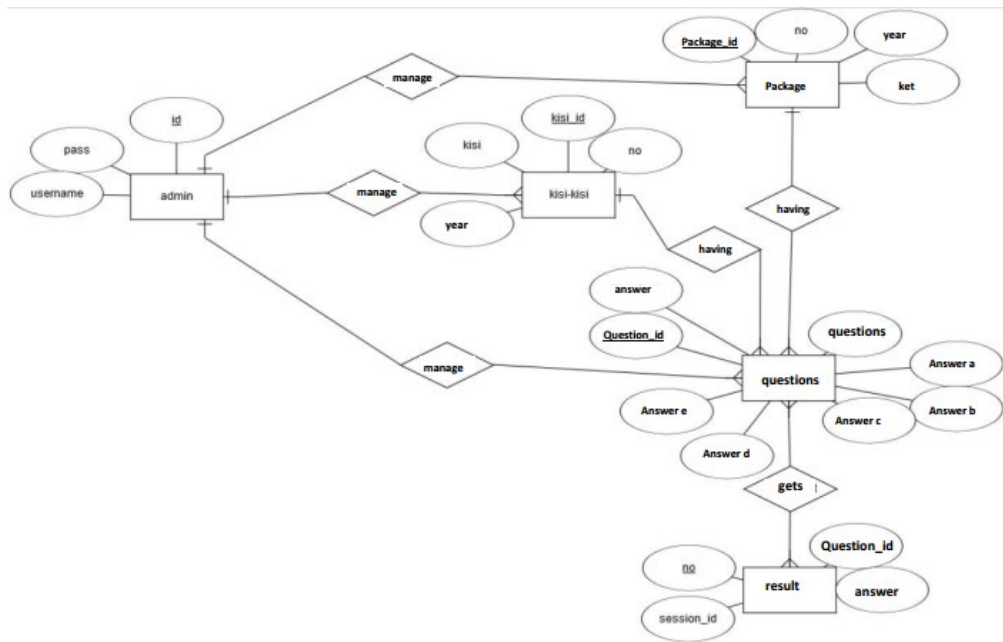


Figure 9. Entity Relationship Diagram.

4) Design Interface

The back-end application design was made in simple look and view, so it will be easy to use. The main interface design show in Figure 10.

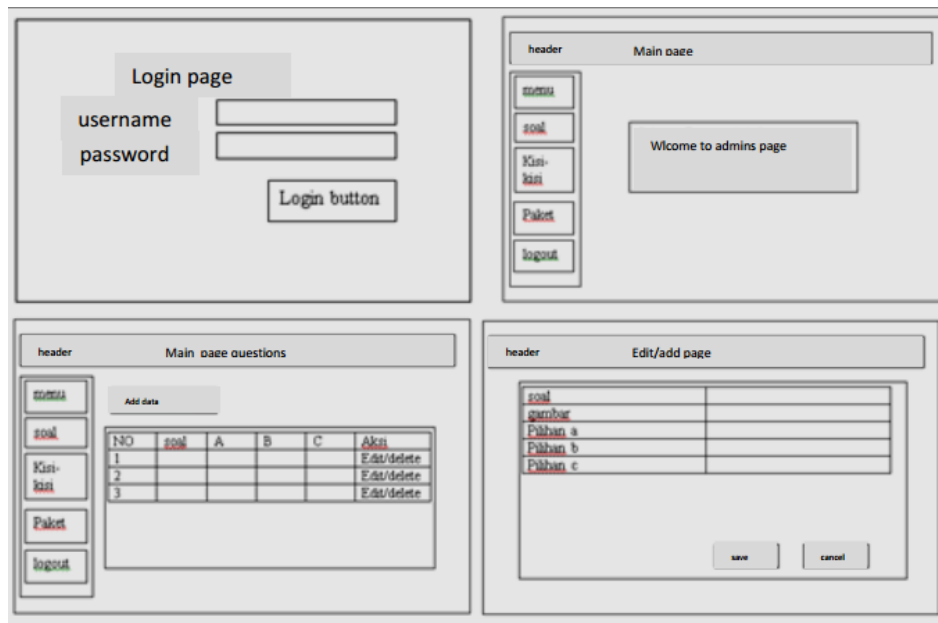


Figure 10. Back-End Application Interface Design

The design interface of front-end application is made in accordance with the requirement of the application. The main view design on the system can be seen in Figure 11.

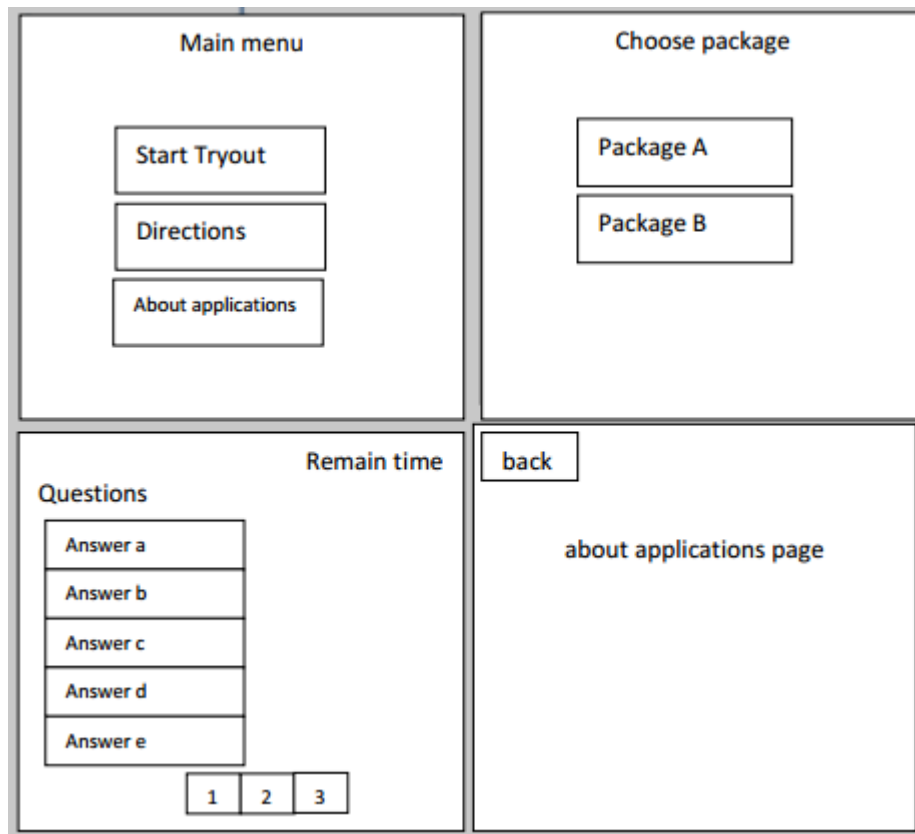


Figure 11. Front-End Application Interface Design

5) Database Design

Figure 12 shows the tables that are in the database. The relation table is shown by a connecting line.

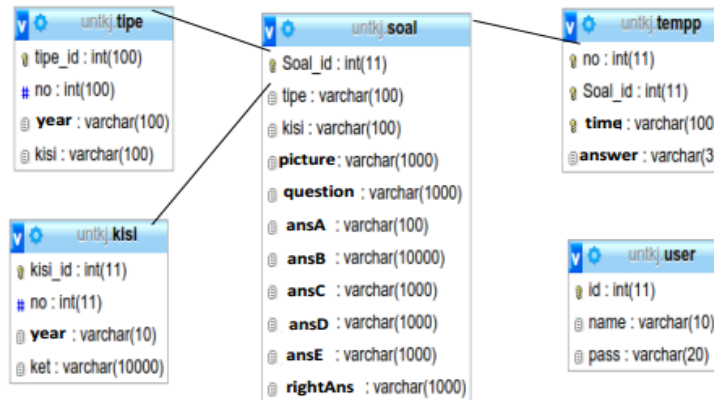


Figure 12. Relation Table

Implementation

The implementation stage must be done after all of the application's design has been finished and it is determined the specifications. The program that has been done then translated into codes with programming language. Back end application is made based on the web service. the interface of back-end application is showed in Figure 13.

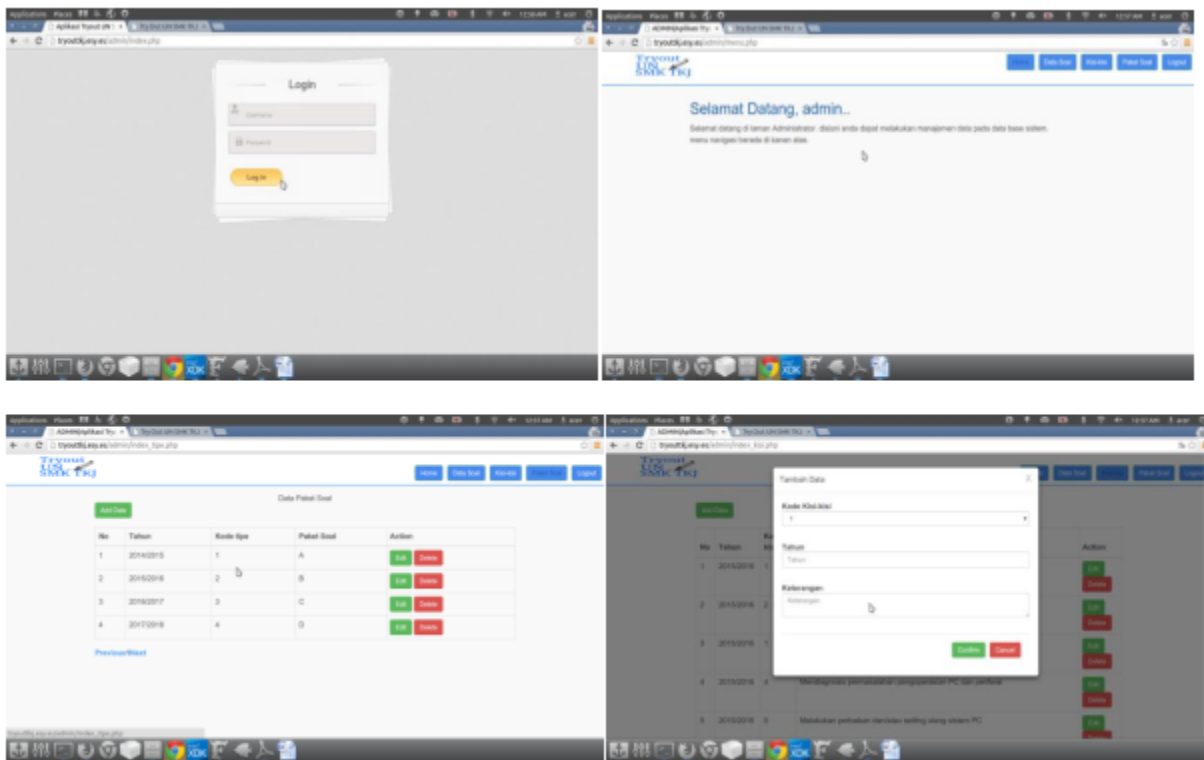


Figure 13. Backend application

Front-end application is made on android based. The application interface can be seen in Figure 14.



Figure 14. Front-end Application



## Integration and Testing

In this stage will be done integration and testing of the application. The integration is done where the implementation result is applied to the platform of each application that has been made until ready to be tested. This test aims to know the features of the application is running work properly. The test is done by media experts and end users. The results of testing obtained the following results:

**Table 1. The Back-End Application Assessment Table By Media Experts**

Number	Indicator	Score
1	Aspect of Language	4,33
2	Utilization Aspect	4,37
3	Aspects of Software Engineering	4,40
4	App Display	4,41
<b>Average</b>		4,37

Based on the final assessment from media experts for the backend application has score 4,37. The result indicates that the application is very feasible to use. According to media experts, back-end application needs to add an instructional page in the application. The interface in backend application is made simple because this system is used to manage the database.

**Table 2. The Front-End Application Assessment Table by Media Experts**

Number	Indicator	Score
1	Aspect of Language	4,33
2	Utilization Aspect	4,50
3	Aspects of Software Engineering	4,60
4	App Display	4,25
<b>Average</b>		4,42

Based on the final assessment from media experts for the frontend application get average score 4,42. The result indicate that the application is very proper to use. According to media experts front-end application need to fix on language aspect and consistency of the symbols. Overall this application already has good interface and function that feasible to be used.

**Table 3. Assessment Tables By End-User Back-End Applications**

Number	Indicator	Score
1	Ease of operation	4,50
2	Fitness function	4,73
3	Application benefit	4,90
4	App Display	4,50
<b>Average</b>		4,65

From that assessment, this application is appropriate with the main purpose of this app. It is used to manage the database. The assessment from the teacher as an administrator for the back-end application get score 4,65. This result shows that the application is very feasible to use.

**Table 4. Assessment Tables Front-End Applications By End-User**

Number	Indicator	Score
1	Ease of operation	4,50
2	Fitness function	4,73
3	Application benefit	4,90
4	App Display	4,50
<b>Average</b>		4,42

Based on the assessment of the front-end application gets score 4.42. These results indicate that the application is very feasible to use. From the student assessment, the front-end app view is still simple and monotonous. This deficiency can be improved by changing the display design on the application. On the other side, the appraisal on the application benefit aspect shows that the application is useful and can help the students in preparing themselves to face the UN, this is shown from the students' scores of 4.90.

## Conclusion and Recommendation

The result of the assessment from media experts of 4.37 for Android-based front-end applications and 4.42 for web-based back-end applications, the assessment of back-end applications by users got a score of 4.65, while the assessment of students of 4.53. So it can be concluded that the National Tryout Exam Application Vocational Theory of SMK TKJ Department with recommendations based on Android based worth to use. From the assessments of media experts for front-end application based on android get score 4,37 points and get 4,42 points for the backend application based on the web, the assessment of backend applications by user got 4,65 point, while from students got 4,53 point. So it can be concluded that Android based try out Application for National Exam of vocational theory in SMK TKJ accompanied with learning outcomes recommendation was feasible to use.

With the development of national exam try out application in SMK TKJ based on android gives implications as follows: 1) Students can practice doing the exercise for facing national exam. 2) Students have to find out the material that they don't understand yet. 3) Help students to prepare them self for facing national exam. For the sustainability of this application can be done by adding more exercise packages and more varied exercise, make this application to work offline, and more material for the exam.

## References

- Di Marketing (2016). Study About Smartphone Usage In Indonesia. Tokyo
- Farid, M.G. (2012). Analisis Dan Perancangan Sistem Ujian Online Di SMP Muhammadiyah 2 Godean. Skripsi Tidak Dipublikasikan. STMIKAMIKOM Yogyakarta, Yogyakarta
- Martono K.T., Nurhayati O. D. (2014). Implementation of Android-Based Mobile Learning Application as a Flexible Learning Media, International Journal of Computer Science Issues ,Vol. 11, Issue 3, No 1, May 2014
- More K. A., Chandaran P. (2016) .*Native Apps vs Hybrid Apps (Ionic, Titanium)*, International Journal of Current Trends in Engineering & Research, Volume 2, Issue 6 June 2016
- Nashirah, Dian. (2009). *Sistem Tryout Online Untuk Ujian Masuk Perguruan Tinggi Dengan ASP.NET*. Seminar Penelitian Periode Juni 2009 Diperoleh pada 9 Juni 2016, dari [http://digilib.its.ac.id/public/ITS-Undergraduate-11951-5107100520-Paper\\_ID.pdf](http://digilib.its.ac.id/public/ITS-Undergraduate-11951-5107100520-Paper_ID.pdf)
- Nugroho, B. (2005). *Database Relasional dengan MySQL*. Yogyakarta : Andi Republik Indonesia. (2003). Undang-undang Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional. Jakarta.
- Ruswanto, Zelly. (2014). *Rancang Bangun Aplikasi Try Out Ujian Nasional Sekolah Menengah Atas Berbasis Android*. Skripsi Tidak Dipublikasikan. Universitas Muhammadiyah Surakarta, Surakarta.
- Sommerville, Ian. (2011). *Software Engineering Ninth Edition*. Boston. Addison-Wesley.