

# Study of the Implementation of BeSmart Computer Base Test (CBT) Application in SMK End Semester Examinations

(Implementation studies were carried out at the State Vocational School 4 in Pekanbaru City)

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**Abstract**—The examination is a form of evaluation held after the implementation of the learning process. The high level of graduation from a school reflects the success and progress of the school. The forms of evaluation that are often carried out so far are in the form of a paper test, which poses many problems, such as being inefficient and costing a lot of money. In addition, it is also difficult for students to perform exams such as starting to answer questions, circle answers on the answer sheet that, if they are poorly surrounded, can be fatal. To overcome the above problems, it is necessary to create a computer-based test application (CBT) allowing the implementation of an online computer evaluation called BeSmart. The purpose of developing this application system is to rationalize costs and to make the evaluation process effective. The adopted method adopts the development of a product procedure model. When implementing the exam using this application, it may be easier for all elements of the school, such as teachers to easily enter questions into the question bank without having to print them on paper, students easily answering exam questions and all the evaluation process data can be displayed and stored properly on the server, so this BeSmart Computer Test Application (CBT) may be the best solution for the exam. conducting online exams in vocational high schools. Although various problems remain in the implementation, there are still problems that can be solved. Therefore, from the results of these problems, this application needs to be further developed.

**Keywords**—*implementation; online exam; Computer Based Test (CBT); BeSmart*

## I. INTRODUCTION

Education is a very important investment for every human who lives on this earth, someone with good education then the future and his life will also be better but vice versa someone with poor education the future and life are also not good. Likewise, with the success of education someone can be judged by the insights gained after completing education later benefits can be felt for themselves and for the community. In the world of education, the exam has been be one effective way to

measure the level of student learning achievement in the School. Like the existence of Daily Deuteronomy, Middle Examination Semester and Final Semester Examination. All this time there are still many exams carried out conventionally using paper and pens or commonly called exams paper-based test,

The implementation of this paper-based test still has various problems such as: (1) circle the answer in the answer paper if it is wrong to circle it can be fatal, (2) requires a lot of money, (3) prone to acts of fraud in work problem, (4) requires a long time in prepare a question script, (5) questions made often repetitive and less updated, and (6) results the exam can be obtained in a long time. Problems like this are also findings for researchers at the school where the research is Vocational School 4 in Pekanbaru, so that the implementation of the exam like this it is seen to be less effective and efficient at this time. To overcome the various problems above, then need to be made an examination system that can be controlled from various aspects such as being able to reduce costs and reduce the level of fraud and the implementation of the exam can be faster, effective and efficient. Therefore, suitable system to be applied in accordance with things the above is a computer-based test system or commonly referred to as computer-based test (CBT). The use of computer technology is a solution the right one, then designed and made a computer-based exam system that is named with BeSmart. The success of the utilization processes this system cannot be separated from several things. First thing, great desire from all elements of the school so the test process can take place efficiently, effectively, safe, accurate and fast. Second, the existence of facilities supporters and human resources who are ready in use the system continuously and continuous. Computer Based Test (CBT) BeSmart is a test that is carried out use the computer as the main medium in doing exam activities. CBT is innovation new in the digital era of technology, where CBT presents evaluation system or online exam managed by server.

Unlike previous searches, cryptographic search for the public key with the Rivest Shamir Adleman (RSA) method. In his research, he used two public keys and several mathematical relationships. Two public keys are sent separately so that the attacker does not know much about the key and cannot decrypt the sent message. RSA can be used for systems requiring high security [1]. The results of the simulation presented show that the RSA method is generally better than the discrete logarithms (El Gamal) because it generates a small number of ciphers to save memory. RSA offers another benefit: reducing traffic (economy) and network bandwidth [2].

The Computerized Test System (CBT) has been developed for adoption at the University of Nigeria. The online examination system provides students with questions defined by the speaker and produces a report on the results of the students who take the exam and the general summary of the results of the exam at the request of the user. Some problems, such as errors in reviewing exam results, cheating during exams, heavy paper use, and others will automatically be minimized once adopted by a computer-based exam system. The cost of reviewing examination results is greatly reduced because it will no longer be necessary to print questions or answer the answer book. However, further research needs to integrate video theory and e-assessment issues so that adverse events can be examined [3].

After the implementation of the BeTmartini (CBT) computerized test during the last semester of SMK Negeri 4 Pekanbaru, observations and interviews with researchers who participated in exams such as Proctor, exam supervisor, technicians and some students obtained information such as the implementation of the review was good, the rate of fraud can be reduced, funding is relatively efficient and the results of the reviews obtained very quickly can be presented. In addition, there are still gaps in the problems encountered. On this basis, researchers can formulate an existing problem, namely how the implementation of CBT can work properly and develop a BeSmart computer-based test application system (CBT) that can work optimally and cover all the gaps that remain.

After applying Computer Based Test (CBT) BeSmartini in the final semester examination of State Vocational School 4 Pekanbaru, through observations and interviews of researchers with examiners such as Proctors, Supervisors Exams, Technicians and some students obtained information like the implementation of the test is good, level exam cheating can be suppressed, relative financing effective and the results obtained are very fast presented. Besides that, there is still a gap problem found. Based on things the researcher can formulate the problem namely how the application of CBT can work well and develop an application system This BeSmart computer-based test (CBT) can run optimally and can cover all deficiencies that still exists.

## II. LITERATURE REVIEW

### A. Test, Assessment and Evaluation

According to Zainal Arifin, the test is a tool contains a series of tasks that must be done or questions that students must answer for measure an aspect of a particular behavior [4]. As

for functions the test, according to Sudijono is a measuring device against students and also as a measuring tool success of teaching programs. In compiling test, there are characteristics of a good test so student learning achievement can be interpreted optimally. Among the characteristics of a good test are: 1. Tests are valid or have appropriate validity or right. 2. The test has reliability or is reliable. 3. Tests are objective or sourced from the subject matter provided. 4. Tests are practical and economical.

In addition, an evaluator must also pay attention principles of test development so that the test function and the objectives of the implementation can be achieved according to which are expected. According to Sudijono principles basic preparation of learning outcomes tests, namely: 1. Tests for learning outcomes must be able to measure results learning that has been set in accordance with the objectives instructional; 2. Test items must be a sample represent the population of subject matter; 3. Form questions that must be issued in the test must be made varied; 4. The test must be designed according to its use to obtain the desired results; 5. The test must have reliability that can dependable; 6. Tests on the side must be used as tools a measure of student learning success, also must can be used as a tool to find information useful for improving student learning and how to teach the teacher himself.

### B. Computer Based Testing (CBT) BeSmart

CBT is a computer-aided evaluation system aims to help teachers implement evaluation, both scoring, test execution and effectiveness and efficiency of implementation. Later test the media will be assisted and implemented using a computer.

According to John Daintith, CBT is a use computer to control, both digital and analog testing techniques and quality evaluation components and products [5]. In addition, according to AJ Romiszowski: Computer Based Testing may (like CMI) be part of a CAI system, or may be a stand-alone facility. Some Computer Based Testing facilities are no more than an item bank, which can be used to generate two or more tests of equivalent content and difficulty, to be used at different moments in conventional classroom [6].

Computer based testing (CBT) system or implementation computer-assisted evaluation is derivative or development of computer assisted systems instructional (CAI) or assisted learning computer that is devoted to arable fields evaluation includes a collection of questions and processes automatic scoring, audio, video and interactive media and autorun.

According to Sri Lestari, CBT is a method administration of tests conducted electronically by recording, appraising, or both. CBT is scoring system based on computers and parts from the coverage of Computer Assisted Instructional (CAI) which can be equipped with audio, video, scoring, and autorun services.

Schreyer Institute, calls a number of advantages use CBT in the following assessment: 1. Inclusion of multi-media; Graphics, short video clips or sound files can be included in question stems, responses or feedback. 2. Item format; CBT allows for items types that can't be processed by scanning paper bubble sheets, such as "check all that apply." 3. Reduce

paper costs; Computer-based tests for large classes avoid what can be a substantial cost in producing paper tests. 4. Scoring; Many types can be items automatically scored.

Some of the advantages of the CBT system are mentioned above include packaging questions more interesting because delivered multimedia, not using pen and paper, reduce costs, test calculations Valid score, save time, faster in decision making as a result of implementation test.

Procedure for Using Computer Based Testing (CBT) BeSmart:

1) *Pre-test stages*

- Proctor and Test Technicians Sterilize all exam devices like Personal Computers, Laptops, and Android Gadgets
- The Proctor and Technician prepares the server and client to install the CBT BeSmart application Test
- The Proctor and Technician ensure the CBT application BeSmart Test can run well, so that between server and client can well connected.
- The Proctor and Technician ensure all questions already included in the Problem Bank folder
- The Proctor and Technician ensure everything examinees are in accordance with the schedule, session, class and exam subjects
- The Proctor and Technician ensure the user login and the participant's password has been created with good.
- The procurer ensures all attendees attendance the exam has been printed well.

2) *Execution of exams*

- Proctor and Supervisor Examination Ensure all test participants are present according to schedule
- Proctor and Supervisor Examination ensure all user login and password of the examinee already distributed well
- Proctor and Supervisor ensure all examinees have logged in accordingly with the user and password.
- Examination Examiners ensure attendance of participants has been carried out according to the test number and the seat of the examinee
- Proctor and Supervisor Examination ensure Examination can run well and smooth
- Proctor and Supervisor Examination ensure Execution of the test in accordance with the time provided

3) *Post exam*

- The Proctor prints all implementation reports Exams such as Guessing the Exams Implementation Event, Participant Answer Report, Participant Exam Results.
- Supervisor Signs all reports test execution

- Technicians ensure the exam room and all the device is well organized and positioned the application on the client is in standby

III. RESEARCH METHODS

The research method used in this study is a method of observation and direct interview with users who are in direct contact with a computer-based test (CBT) application system This BeSmart. The method is done more to research and development (research and development) to facilitate system users to be able to apply what they want. Activities carried out include needs analysis application, media formulation, application implementation, application evaluation, application development, application CBT.

Research development model procedure application product development with patterns as the following:

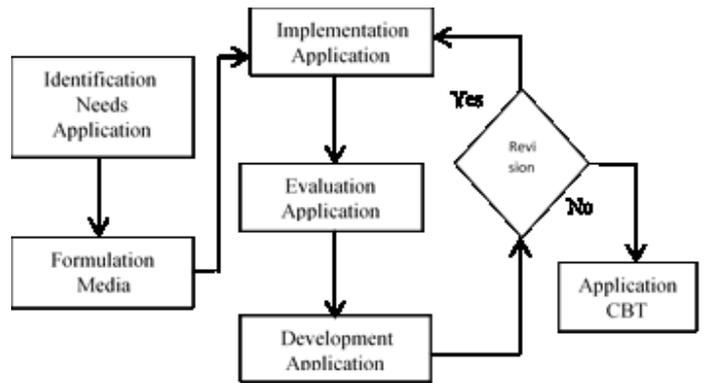


Fig. 1. Model diagram of CBT BeSmart procedure.

IV. DISCUSSION

A. *Application Implementation Requirements (Hardware and Software)*

For implementing computer-based test, the main is minimum requirements for use are needed hardware and software, this is done so that the application it can run well and optimally. The requirements are:

Hardware: Server (Recommended Min Core i5 Processor RAM 8 Gb), Client (Minimum Intel PC / laptop Latest version of Pentium 4 and Gadget Android), Networking Device, Access Point, Printer

Software: Operating System (Windows, Linux, MacOS and Android), Application Based Computer Test (CBT) Be Smart Version 3.0, Xampp Version 3.2 for Windows, The latest Google Chrome browser, MySQL Database, PHP my Admin.

B. *Computer Based Test Application Topology BeSmart*

Topology is the form / flow of the application work system when executed, for computer-based test implementation This BeSmart uses star topology or more known as client server topology, so everything the test process on the existing client will be connected on one server. The topology is like picture below:



Fig. 2. Display of CBT BeSmart topology.

C. Results of BeSmart CBT Application Implementation

Implementation of computer-based test (CBT) applications BeSmart at the end of semester examination of State Vocational School 4 Pekanbaru, where the results of the implementation in general, all the process of implementing the exam can run well and smoothly even though still there are shortcomings and obstacles to running the application. The following is the application view computer-based test (cbt) besmart on two sides, namely server side and client side.

This server-side view starts from the Admin process log in until the setting of the exam includes stages as below:



Fig. 3. Display of CBT BeSmart Admin login.

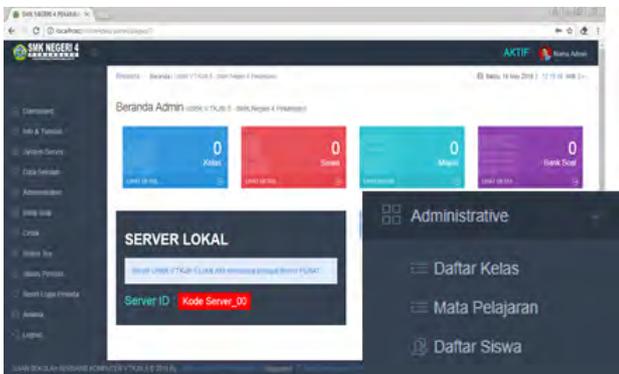


Fig. 4. Display of CBT BeSmart dashboard.

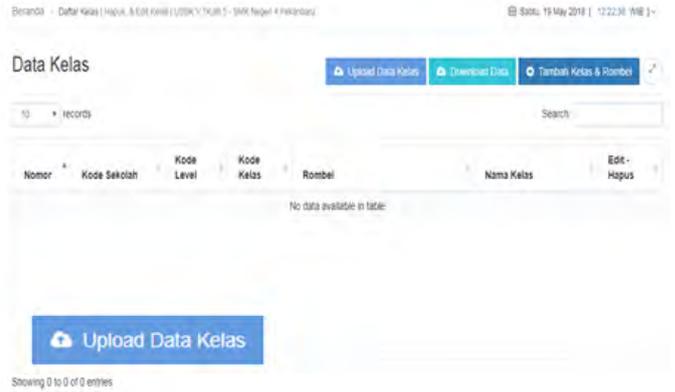


Fig. 5. Display of CBT BeSmart class settings.



Fig. 6. Display of CBT BeSmart main menu.

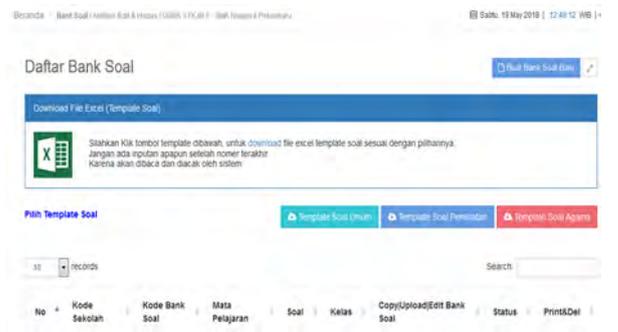


Fig. 7. Display of List of CBT BeSmart question banks.

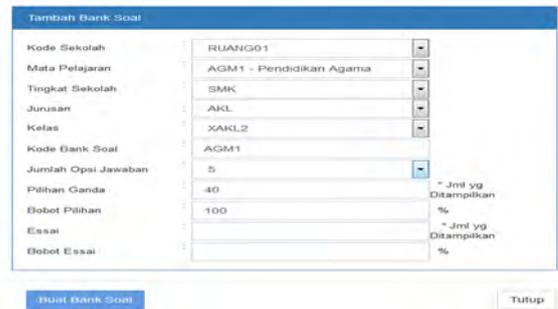


Fig. 8. Display of add CBT BeSmart question banks.



Fig. 9. Menu display status of BeSmart CBT test.

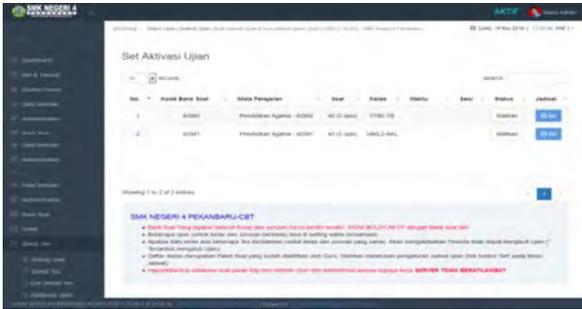


Fig. 10. Display of activation menu for CBT BeSmart exam.

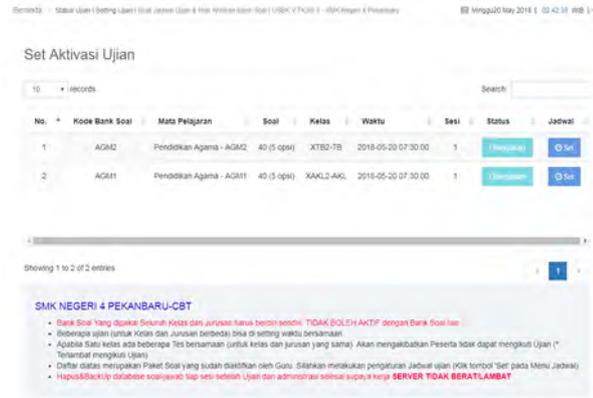


Fig. 11. Display of CBT BeSmart test activation.

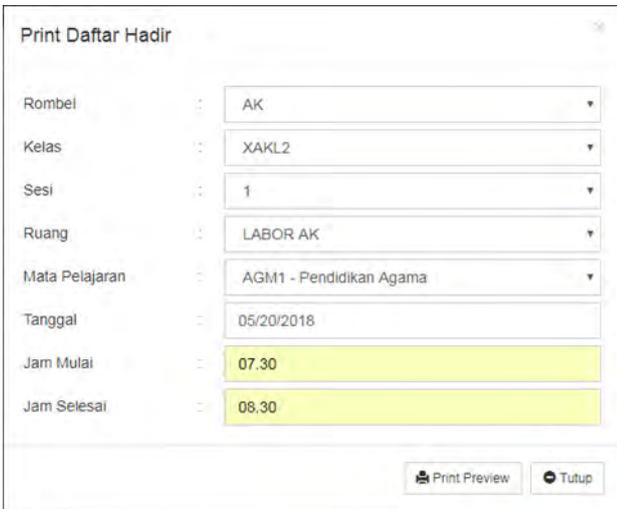


Fig. 12. Display of CBT BeSmart present attendance set.

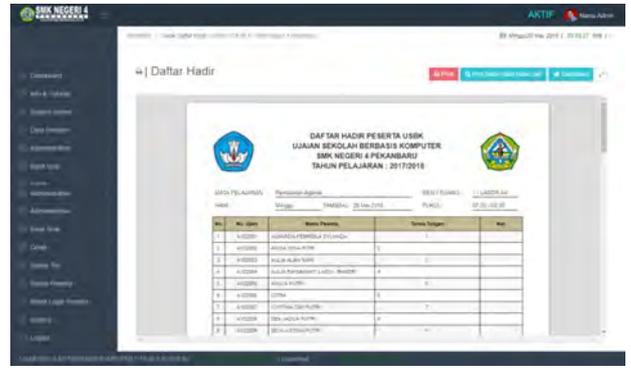


Fig. 13. Print display of CBT BeSmart attendance list.

The view from the client side starts from the process the exam participant is logged in until the completion of the exam includes the stages as below:



Fig. 14. Display of CBT BeSmart participant login.

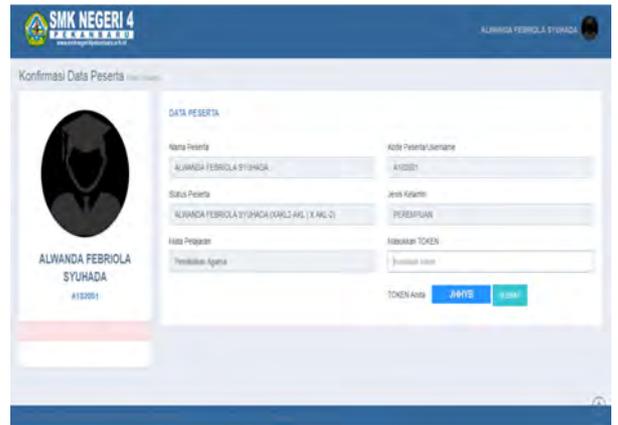


Fig. 15. Display of CBT BeSmart participant data.

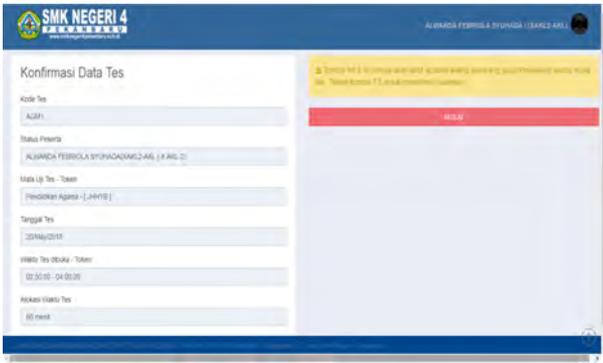


Fig. 16. BeSmart CBT test data confirmation display.

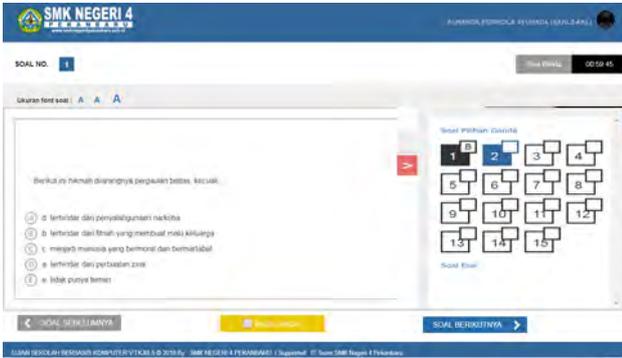


Fig. 17. BeSmart CBT test page display.

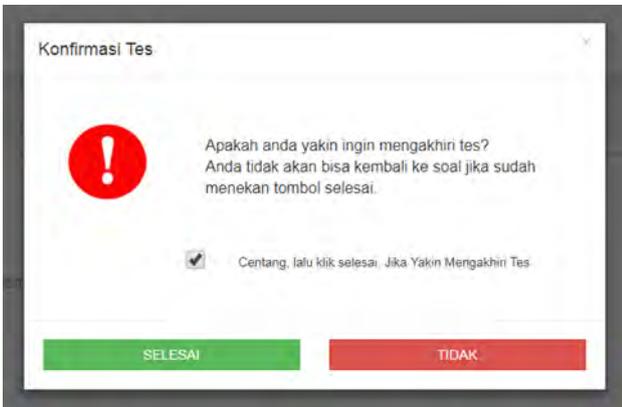


Fig. 18. Display of CBT BeSmart test completed.

**D. Display of CBT BeSmart Test Completed**

The observations were made from the stage of preparation of the installation to the actual examination stage, but the implementation of the test was still problematic by means of a computer test application (cbt), like 1). The network connection is less stable, 2). Unsecured database, 3). The results of absenteeism and minutes are not clear, 4). The illustrated questions are less able to adjust to the screen display of the monitor, 5). Test results / results always require special treatment or non-automatic discharge. while the interviews were conducted after the test, some interviewees, such as teachers, prosecutors and students, were interviewed. Interview sampling was randomly conducted on 10 teachers, 10 proctor /

technicians and 30 students. The questions asked were limited to basic questions such as what respondents think about the implementation of the CBT test. The answers submitted are only in the form of Very good, good and less.

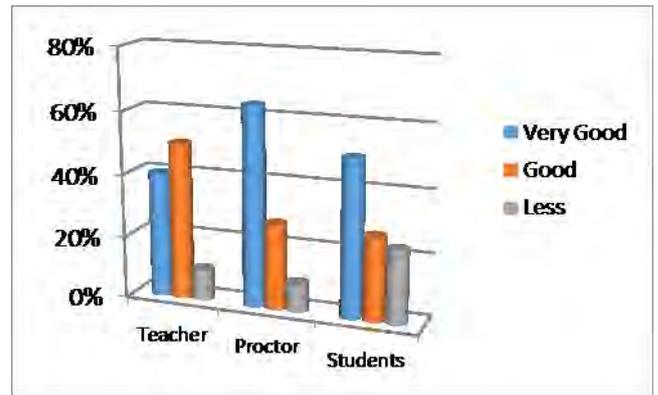


Fig. 19. Display of interview result graphic.

**V. CONCLUSIONS AND RECOMMENDATIONS**

**A. Conclusion**

Computer based test application implementation (cbt) besmart in the implementation of the final semester of State Vocational School 4 Pekanbaru can be summarized as follows: 1. Examination in general can run well, starting from preparation, Examination until post implementation exam. 2. At the time of the exam, it was found various problems like Server Down, disconnected network connection and the administration of the exam is less documented well 3. Problems that occur at when the exam can be overcome properly though takes a long time and solution it is only temporary.

**B. Recommendations**

Computer based test application implementation (cbt) besmart in the implementation of the final semester of State Vocational School 4 Pekanbaru can be given advice as the following: 1. At the time of preparation the exam should be done well, so that no problems occur so the network connection is unstable 2. Computer based test development (cbt) there are still many besmart improved, so that the application can run well and optimally. 3. We recommend that the direction of development is not only to device and application system, but also covering the test material itself, so the exam is not done cognitive only but can also be cultivated psychomotor (practice material).

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