Analysis of Software Quality in the Implementation of EXOCBT VPS (Extraordinary Computer-Based Test Virtual Private Server) in the Final Semester Examination at MTs Kadudampit: An Approach Based on the ISO 25010 Model

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***Abstract*—This research aims to evaluate the implementation of the Extraordinary Computer Based-Test Virtual Private Server (EXOCBT VPS) in the final semester exam at MTs Kadudampit using the ISO/IEC 25010 Model as a standard assessment framework. The focus of the assessment includes aspects of functionality, performance efficiency, maintainability, portability, usability, reliability, security, and compatibility. The main aim of the research is to improve the efficiency of Android-based exams. The research methods used involve case studies, quantitative questionnaires, interviews, and ISO/IEC 25010 analysis to evaluate the quality of EXOCBT implementation. The research results provide deep insight into the contribution of EXOCBT VPS to school exam software and positively contribute to the efficiency of Android-based exams, with significant scores in the evaluated aspects. The conclusions and recommendations of this study are based on the evaluation findings. The conclusion confirms that EXOCBT can be considered an effective and reliable solution in the Education context. Recommendations involve further development of the Computer-Based Test (CBT) system by considering the aspects being evaluated so that it can provide maximum contribution to improving the quality and efficiency of school exams.**

Keywords—EXOCBT, VPS, ISO/IEC 25010, Software, MTs Kadudampit

I. INTRODUCTION

In the ever-growing digital era, computer or Android-based exams have become an increasingly popular approach to measuring student knowledge. The implementation of the Extraordinary Computer-Based Test Virtual Private Server (EXOCBT VPS) at MTs Kadudampit is a progressive step in adopting technology to increase the efficiency of school exams. Android-based exams have the potential to provide a more dynamic and responsive exam experience, in line with current technological developments.

In this context, this research has the main objective to emit EXOCBT software quality using the ISO/IEC 25010 Model as a standard assessment. This model offers a comprehensive framework that covers critical aspects such as functionality, performance efficiency, maintainability, portability, usability, reliability, security, and compatibility. This evaluation is important to ensure that EXOCBT can operate well and make a positive contribution to the examination process in the education environment.

With a focus on increasing the efficiency of Android-based exams, this research also utilizes holistic research methods, involving case studies, questionnaires, interviews, and ISO/IEC 25010 analysis. This approach is expected to provide an in-depth understanding of how EXOCBT VPS can provide added value in the management of school exams.

The results of this research are expected to provide substantial insight, enriching our understanding of the contribution of EXOCBT VPS technology to Android-based exams. Thus, this research can open opportunities for further development in increasing the efficiency and effectiveness of examinations in the educational environment, in line with the demands of the ever-growing digital era.

II. LITERATURE REVIEW

A. Computer-Based Testing (CBT)

Computer Based Test (CBT) Refers to a form of exam which is carried out using a computer as the main medium. In CBT, the process of presenting and selecting questions is computerized, ensuring that each examinee receives a different package of questions [1]. CBT, or computer-based testing, has become an increasingly accepted practice in Educational evaluations and performance assessments. The development of information technology has had a significant impact on the way exams are conducted and measured. CBT is often described as a modern solution that provides efficiency and accuracy in the examination process.

B. Virtual Private Server (VPS)

Virtual Private Server (VPS) Self Service is a private server where all existing resources are only used by one user and do not affect the activities of other users [2]. Users have full control over all configurations and resources available on the VPS, making it possible to manage and carry out any actions as desired.

C. Extraordinary Computer Based-Test (EXOCBT)

Extraordinary Computer-Based Test (EXOCBT) is an exam management application developed by the Shellrean developer team. The philosophy of Extraordinary CBT comes from the words "Extra" and "Ordinary". The word "Extra" indicates awareness that a good system will get top priority, while "Ordinary" indicates that this application is as if it were ordinary without any special features in it [3]. This philosophy underscores our commitment to providing exam solutions that are not only efficient and reliable, but also carry elements of excellence that may not be immediately apparent at first glance.

Figure 1: Views of Extraordinary Computer-Based Test

D. Android

The Android Operating System is a Linux-based operating system specifically designed for mobile telephone devices or smartphones. Android includes software for mobile devices consisting of an operating system, middleware, and key applications [4]. The application development process on the Android platform uses the Java programming language. Android's core set of applications involves various functions such as email clients, SMS programs, calendars, maps, browsers, contacts, and so on.

E. ISO/IEC 25010

The ISO/IEC 25010 model is the basis of the product quality evaluation system. This model determines which quality characteristics will be considered when transmitting a software product's properties. The quality of a system is the extent to which the system meets the stated and implied needs of various stakeholders and thus meets its providing value [5]. The product quality model defined in ISO/IEC 25010 consists of eight quality characteristics shown in Figure 1 below:

Figure 2: Product quality model defined in ISO/IEC 25010

1) Functionality

Functionality, in the context of software, refers to the ability to provide features that suit users' needs and can satisfy them. This envy consists of the following sub-characteristics:

1. Functional Completeness
2. Functional Correctness
3. Functional Suitability

2) Performance efficiency

Efficiency in the context of software refers to the ability to provide performance that is appropriate and proportional to the amount of resources used under certain conditions, such as storage efficiency. This characteristic consists of the following sub-characteristics:

1. Time Behavior
2. Resource Utilization.
3. Capacity

3) Maintenance

Maintainability in the context of software refers to the ability to undergo modification. this characteristic consists of the following sub-characteristics:

1. Modification Capability
2. Recyclability
3. Testing Capabilities
4. Analysis
5. Modularity

4) Portability

Portability in the context of software is the ability of software to change specifications from one environment to another. This characteristic consists of the following sub-characteristics:

1. Installation Capability.
2. Replacement Capability.
3. Adaptability

5) Usability

Usability in the context of software Refers to the ability of software to be understood, learned, used, and captivated by users. This characteristic consists of the following sub-characteristics:

1. Introduction to Conformity.
2. Learning Ability.
3. User interface aesthetics
4. Protection Against User Error
5. Operability.
6. Accessibility

6) Reliability

Reliability in the context of software refers to the ability to maintain a certain level of performance, such as accuracy, consistency, simplicity, and fault tolerance. This characteristic consists of the following sub-characteristics:

1. Fault Tolerance.
2. Recoverable.
3. Maturity
4. Availability

7) Security

Security compliance is an assessment of the extent to which a software or application follows applicable standards and regulations, especially those relating to security systems. This characteristic consists of the following sub-characteristics:

1. Confidentiality.
2. Non-repudiation.
3. Accountability.
4. Integrity.
5. Authenticity.

8) Compatibility

Compatibility is the degree to which a product, system, or component can exchange information with other products, systems, or components, and/or perform required functions while sharing the same hardware or software. This characteristic consists of the following sub-characteristics:

1. Ko-eksistensi.
2. Interoperabilitas.

III. Research Methods

This research was specifically carried out at MTs Kadudampit which is located on Jl. Suryakencana Km. 04 District. Kadudampit, Kab. Sukabumi. The research implementation period covers the period of 14-16 December 2023. The implementation of Computer-Based Test (CBT) has been implemented since December 2023, accompanied by the implementation of the Android-based Final Semester Assessment for the 2023/2024 lessons. The data collection method uses a literature review approach, questionnaires, case studies, and ISO/IEC 25010 analysis to determine the quality of the implementation of the Extraordinary Computer-Based Test (EXOCBT) computer-based examination system.

IV. Result and Discussion

A. Problem Analysis

This research aims to start implementing EXOCBT VPS (Extraordinary Computer-Based Test Virtual Private Server) in the final semester exam at MTs Kadudampit. The research instrument consisted of a list of questions or questionnaires adapted to the ISO/IEC 25010 model indicators, as well as

interviews with the MTs Kadudampit final semester exam implementation committee. The research sample was taken from 53 respondents who were students of classes VII, VIII, and IX. The questionnaire uses a Likert scale with detailed choice options, namely 5=Very good (SB), 4=Good (B), 3=Fair (C), 2=Poor (K), and 1=Very poor (SK).

B. Questionnaire

A questionnaire was used to collect respondents' opinions regarding the evaluation of the EXOCBT test. Distribution of questionnaires is carried out online via the platform https://www.kuesio.id/.

TABLE I. Questionnaires were given to respondents

No	Statement	SB	B	C	K	SK
1	**Fungsionalitas (Functionality)**					
	To what extent does the EXOCBT application support the smooth implementation of the Final Semester Examination?	13	31	11	0	0
	What is the level of accuracy and timeliness in using the EXOCBT VPS during the exam?	8	30	13	3	1
2	**Efisiensi Kinerja (Performance)**					
	How responsive is the EXOCBT system during exam administration?	11	29	15	0	0
	How do you assess the speed of access and data transmission on the EXOCBT VPS application?	14	31	10	0	0
3	**Kompatibilitas (Compatibility)**					
	Can EXOCBT operate properly on the operating system used by the examinee?	8	35	9	3	0
	What is the level of adaptation of the EXOCBT web server to the software (smartphones) generally used in school networks?	12	32	8	2	0
4	**Kemudahan Penggunaan (Usability)**					
	How can using the EXOCBT feature make it easier for users to take exams?	10	35	8	1	0
	To what extent is the EXOCBT interface easy to understand and access for test takers?	18	25	9	2	0
5	**Ketahanan (Reability)**					
	To what extent can EXOCBT be relied on to run exams without experiencing technical problems?	6	35	10	4	0
	Is it possible that the EXOCBT VPS often experiences problems during the exam?	10	22	19	3	1
6	**Keamanan (Security)**					
	What are the permissions and authorization procedures on EXOCBT to ensure only authorized users can access and manage exam data?	11	34	9	1	0
	How does EXOCBT VPS manage user access rights and permissions to ensure each user has access according to their responsibilities?	10	39	6	1	0
7	**Portabilitas (Portability)**					
	How does EXOCBT VPS support the various types of hardware that may be used at various exam locations?	6	33	15	2	0
	To what extent can EXOCBT VPS be installed and operate smoothly on various operating systems commonly used in educational environments?	11	31	12	3	0

C. Interview

Based on responses from interviews by the 25010 model regarding maintenance, several suggestions and input can be seen to improve the quality of exam implementation using the Extraordinary Computer-Based Test Virtual Private Server:

1) Suggestions to improve implementation

1. "No, but it is easy to understand and good to use when taking exams."
2. "No, but it is easy to understand, and good to use when taking exams."
3. "Do your usual activities during the exam, don't be too tense, and don't be too afraid."
4. "Reduce distractions during the exam."
5. "My advice is to use EXOCT VPS."
6. "Good at carrying out exams."
7. "Must be better and have no errors."
8. "That's good enough."
9. "Helps with exams."
10. "EXOCBT can support and improve quality in exam implementation."
11. "EXOCBT VPS should be further developed so that students are more flexible in taking exams."

2) Technical considerations

1. "It's better to use an application."
2. "VPS network must be upgraded."
3. "The network must be stabilized as much as possible."
4. "To what extent the EXOCBT VPS can be installed and operated smoothly and used in a school environment."

3) Positive feedback

1. "No suggestions."
2. "Nothing."
3. "Everything is quite good in its operation in carrying out the exam."
4. "Good."
5. "Very good."
6. "No, thank you."
7. "Very good."

By analyzing suggestions and feedback provided by respondents, system developers or maintainers can identify areas for improvement, fix technical issues, and improve the user experience to match their needs and expectations.

D. Data Analysis Techniques

1) Statistical data analysis

The following is a simple statistical analysis of the Extraordinary Computer Test questionnaire data:

1. Gender

Most of the respondents were women (62.3%) around 33 respondents, while 37.7% were men around 20 respondents.

Figure 3: Pie chart of gender data

2. Position

The majority of respondents were class VIII students (52.8%) around 28 respondents, followed by class IX (30.2%) around 16 respondents, and class VII (17%) around 9 respondents.

Figure 4: Pie chart of position/position data

2) Usability analysis

In testing the usability aspect, it was carried out involving 53 student respondents. Respondents were directed to access an internet browser such as Google Chrome and follow the admin's instructions to type in the router provided. After appearing, respondents are asked to enter the test number and password listed on the participant's login card, and then click the "login" button. Next, they are asked to choose an exam schedule according to the subject schedule and click the "enter" button. After entering the exam waiting room, they are instructed to immediately click "start".

To navigate the questions, respondents are asked to click on the four small square buttons to see the question menu and their order. Fill in the answers by clicking the "A B C D E" option. The right arrow button is for the next question and the left arrow button is for the previous question. Filling in all questions must be done without hesitation. To end the exam make sure you are at the last question and click the green button to end. Respondents were asked to check the "End this Test" box before clicking the finish button. After the test is finished, respondents are asked to click the "back to main page" button and log out.

Figure 5: Initial appearance of the router in an Internet browser

Data usability analysis was carried out by calculating the average answers based on the scores filled in in the questionnaire by respondents. The score calculation formula is (JSB x 5) + (JB x 4) + (JC x 3) + (JK x 2) + (JSK x 1), with the maximum score being JP x JR x 5. The score obtained is then converted into a percentage using the formula P=(Score obtained)/(Maximum score) x 100%.

1. Calculation for Functionality
   1) Total respondent score (question1)
      (13 x 5) + (31 x 4) + (11 x 3) + (0 x 2) + (0 x 1)
      = 65 + 124 + 33 + 0 + 0 = 222
   2) Total respondent score (question 2)
      (8 x 5) + (30 x 4) + (13 x 3) + (3 x 2) + (1 x 1)
      = 40 + 120 + 39 + 6 + 1 = 206
   3) The total score of the respondents
      222 + 206 = 428
   4) Maximum score
      JP x JR x 5 = 2 x 53 x 5 = 530
   5) Rata-rata skor responden
      $\frac{428}{530} \times 100 \approx 80{,}75\%$
2. Calculation for Performance Efficiency
   1) Total respondent score (question1)
      (11 x 5) + (29 x 4) + (15 x 3) + (0 x 2) + (0 x 1)
      = 55 + 116 + 45 + 0 + 0 = 216
   2) Total respondent score (question 2)
      (14 x 5) + (31 x 4) + (10 x 3) + (0 x 2) + (0 x 1)
      = 70 + 124 + 30 + 0 + 0 = 224
   3) The total score of the respondents
      216 + 224 = 440
   4) Maximum score
      JP x JR x 5 = 2 x 53 x 5 = 530
   5) Rata-rata skor responden
      $\frac{440}{530} x\ 100 \approx 83{,}02\%$
3. Calculation for Compatibility
   1) Total respondent score (question1)
      (8 x 5) + (35 x 4) + (9 x 3) + (3 x 2) + (0 x 1)
      = 40 + 140 + 27 + 6 + 0 = 213
   2) Total respondent score (question 2)
      (12 x 5) + (32 x 4) + (8 x 3) + (2 x 2) + (0 x 1)
      = 60 + 128 + 24 + 4 + 0 = 216
   3) The total score of the respondents
      213 + 216 = 429
   4) Maximum score
      JP x JR x 5 = 2 x 53 x 5 = 530
   5) Rata-rata skor responden
      $\frac{429}{530} x\ 100 \approx 81{,}13\%$
4. Calculation for Usability
   1) Total respondent score (question1)
      (10 x 5) + (35 x 4) + (8 x 3) + (1 x 2) + (0 x 1)
      = 50 + 140 + 24 + 2 + 0 = 216
   2) Total respondent score (question 2)
      (18 x 5) + (25 x 4) + (9 x 3) + (2 x 2) + (0 x 1)
      = 90 + 100 + 27 + 4 + 0 = 221
   3) The total score of the respondents
      216 + 221 = 437
   4) Maximum score
      JP x JR x 5 = 2 x 53 x 5 = 530
   5) Rata-rata skor responden

$$\frac{437}{530}\ x\ 100\ \approx 82{,}45\%$$

5. Calculation for Reability
   1) Total respondent score (question1)
      (6 x 5) + (35 x 4) + (10 x 3) + (4 x 2) + (0 x 1)
      = 30 + 140 + 30 + 8 + 0 = 208
   2) Total respondent score (question 2)
      (10 x 5) + (22 x 4) + (19 x 3) + (3 x 2) + (1 x 1)
      = 50 + 88 + 57 + 6 + 1 = 202
   3) The total score of the respondents
      208 + 202 = 410
   4) Maximum score
      JP x JR x 5 = 2 x 53 x 5 = 530
   5) Rata-rata skor responden
      $$\frac{410}{530}\ x\ 100\ \approx 77{,}36\%$$
6. Calculation for Security
   1) Total respondent score (question1)
      (11 x 5) + (34 x 4) + (9 x 3) + (1 x 2) + (0 x 1)
      = 55 + 136 + 27 + 2 + 0 = 220
   2) Total respondent score (question 2)
      (10 x 5) + (39 x 4) + (6 x 3) + (1 x 2) + (0 x 1)
      = 50 + 156 + 18 + 2 + 0 = 226
   3) The total score of the respondents
      220 + 226 = 446
   4) Maximum score
      JP x JR x 5 = 2 x 53 x 5 = 530
   5) Rata-rata skor responden
      $$\frac{446}{530}\ x\ 100\ \approx 84{,}15\%$$
7. Calculation for Portability
   1) Total respondent score (question1)
      (6 x 5) + (33 x 4) + (15 x 3) + (2 x 2) + (0 x 1)
      = 30 + 132 + 45 + 4 + 0 = 211
   2) Total respondent score (question 2)
      (11 x 5) + (31 x 4) + (12 x 3) + (3 x 2) + (0 x 1)
      = 55 + 124 + 36 + 6 + 0 = 221
   3) The total score of the respondents
      211 + 221 = 432
   4) Maximum score
      JP x JR x 5 = 2 x 53 x 5 = 530
   5) Rata-rata skor responden
      $$\frac{432}{530}\ x\ 100\ \approx 81{,}51\%$$

The percentage results are compared with the eligibility criteria in Table II [6]. The usability aspect is said to be good if the percentage results show the "decent" category.

TABLE II ASSESSMENT CATEGORIES USABILITY

Percentage Yield	Eligibility Criteria
0% - 20%	Very Inadequate
21% - 40%	Less Qualified
41% - 60%	Decent
61% - 80%	Eligible
81% - 100%	Very Useful

E. Extraordinary Computer-Based Test Quality Evaluation

Thus, in general, the "Extraordinary Computer-Based Test" software can be said to be feasible or meet the eligibility criteria, especially because most aspects have an average score above 80%.

However, keep in mind that this research is based on respondents' responses to questions related to various aspects of the software. This evaluation can be the basis for further improvements or development so that this software can better meet user needs and expectations.

CONCLUSION

Based on the evaluation results, it can be concluded that EXOCBT can be considered an effective and reliable solution in the educational context. Although several things need improvement, overall this application makes a positive contribution to the efficiency of Android-based exams at MTs Kadudampit. Recommendations for further development include improvements to aspects that are considered quite good and improvements to aspects that still need improvement.

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