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Development of Android-Based Computer-Based Testing (CBT) to Prevent Academic Dishonesty

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Abstract: This study aims to design and develop an Android-based Computer-Based Testing (CBT) system as a preventive strategy against academic dishonesty in the learning evaluation process. The background of this study stems from the high incidence of cheating during conventional digital exams, which have yet to effectively address the exploitation of technological loopholes by students. The research employed a Research and Development (R&D) approach using a modified Borg & Gall development model through stages including needs analysis, product design, expert validation, limited trials, revisions, and field testing. The developed system features several security measures such as randomized questions and answers, screen locking (kiosk mode), restriction of access to other applications, and monitoring of activities during the exam. Evaluations by subject matter and media experts yielded an average feasibility score of 89%, indicating that the application is highly suitable for use. Meanwhile, trials conducted with high school students showed that the application effectively reduced opportunities for academic dishonesty and received positive user feedback. Therefore, this Android-based CBT system holds strong potential as a technological innovation for conducting fair, efficient, and credible educational evaluations.

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Introduction

Learning evaluation is a crucial component of the educational process, aimed at measuring students' competency achievements. With the advancement of information technology, many educational institutions have begun adopting Computer-Based Testing (CBT) as an alternative to traditional paper-based exams (Haryanto, 2019). CBT is considered capable of improving the efficiency, accuracy, and speed of exam administration and grading. However, the digital implementation of CBT, particularly computer- or web-based, still faces serious challenges related to the widespread practice of academic dishonesty (Anwar, M., & Hadi, S., 2020). Cheating during CBT can take various forms, such as opening other applications to search for answers, collaborating with others through online communication, or using support software that can automatically answer questions. This indicates that the adoption of technology without sufficient

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security systems can actually create new opportunities for manipulating exam results (Bowers, 2018). One potential solution is the development of Android-based CBT systems equipped with security features such as screen locking (kiosk mode), activity tracking, and randomization of questions and answers. Such applications not only support flexible and mobile evaluation processes but also provide stronger control over the potential misuse of devices during examinations (Khasanah, A., & Rahmawati, 2020). This research focuses on developing an Android-based CBT application as a preventive measure against academic dishonesty and to promote the creation of fair, objective, and credible evaluation systems within educational settings, particularly at the high school level. Using a Research and Development (R&D) approach, the resulting product is expected to meet the need for a secure and effective digital evaluation system (Borg, W. R., & Gall, 2003).

The development of information and communication technology has brought significant transformations to education, including methods of assessment and testing (Li, X., & Zhang, 2020). The CBT system has been widely accepted as an alternative to traditional paper-based exams, offering various advantages such as efficiency in exam management, faster grading, and the ability to provide real-time feedback. In many educational institutions, CBT is seen as a modern solution to replace manual exams, which are more prone to technical errors and grading delays. However, despite these conveniences, CBT implementation also faces serious challenges related to the potential for academic dishonesty. Research by McCabe and Pavela (2021) found that about 35% of university students in the United States admitted to engaging in academic dishonesty during exams. In Indonesia, a survey conducted by the Quality Assurance Center (2020) showed that 42% of high school students were involved in cheating behavior, particularly in computer-based exams. This data highlights that, even with digital exams, maintaining academic integrity remains a significant challenge, especially when the systems used lack sufficient security features. At SMAN 12 Bandar Lampung, as in many other schools, exam cheating continues to be a serious issue. The most common forms of cheating include using other devices to search for answers, communicating with friends via instant messaging, or manipulating the exam system using third-party applications (McCabe, D. L., & Pavela, 2021).

Cheating during computer-based examinations can take various forms, such as opening other applications to search for answers, collaborating with others through online communication, or using support software that can automatically answer questions. A study by O'Keefe and Gullo (2018) revealed that 52% of students taking computer-based exams at the college level accessed third-party applications during exams to find answers. This indicates that although exams are conducted digitally, systems lacking proper security measures may open new opportunities for dishonest practices. One solution to address this issue is the development of an Android-based CBT system. With its high accessibility and flexibility, the Android platform offers great potential for creating a mobile-accessible exam system that still maintains strict control over participant activities.

According to a report by the International Data Corporation (IDC) in 2021, more than 3.5 billion people worldwide use Android devices, making it a highly relevant platform for digital exam application development (Nurwanti, E., & Mulyani, 2020). The development of an Android-based CBT application can incorporate various security features, such as screen locking (kiosk mode), participant activity tracking, and randomization of questions and answers-all designed to minimize the risk of cheating. The screen locking feature can restrict exam participants' access

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exclusively to the exam application, while the randomization of questions and answers can reduce the likelihood of collaboration among examinees. A study by Li and Zhang (2020) showed that randomizing questions reduced cheating rates by 30% compared to exams using fixed question sets. Additionally, activity tracking during exams can provide digital evidence of suspicious behavioral patterns, facilitating better monitoring and preventive measures. The implementation of an Android-based CBT system at SMAN 12 Bandar Lampung is expected to improve the quality and integrity of examinations, creating a fairer environment for allparticipants. Thus, the development of this system is highly relevant, especially in addressing the challenge of academic dishonesty that continues to occur in computer-based examinations in schools. Through this study, it is expected that an effective solution can be found to strengthen integrity in the learning evaluation system at SMAN 12 Bandar Lampung and contribute to the development of CBT systems in other schools as well.

Research Method

This study employed the Research and Development (R&D) method using a modified Borg & Gall development model (Mahmudi & Martha, 2025), specifically adapted for the purpose of developing an Android-based Computer-Based Testing (CBT) application system. This method was chosen to produce a new product that could be directly implemented at SMAN 12 Bandar Lampung to prevent academic dishonesty in computer-based examinations. The development process of the Android-based CBT application in this study was carried out through the following stages: 1) **Needs Analysis**. At this stage, an analysis of the system requirements at SMAN 12 Bandar Lampung is carried out. The analysis includes understanding the forms of cheating that occur during computer-based exams, the features needed in the application, and the challenges faced by teachers and students in conducting computer-based exams. Data collection is conducted through interviews with related parties, observations, and a literature review related to CBT development and exam security. 2) **Product Design**. Based on the needs analysis, the design of an Android-based CBT application system is carried out. The application design includes the user interface (UI) layout, exam flow, and the implementation of security features such as screen locking (kiosk mode), randomization of questions and answers, and tracking participant activities. The design also takes into account ease of use and accessibility for students and teachers. 3) **Expert Validation**. After the application prototype is designed, it is validated by two types of experts: content experts and media experts. Content experts are subject teachers related to the exams, who will assess the suitability of the questions and content in the application. Media experts are those proficient in application development and user interface design. Validation is conducted through questionnaires and interviews to gather feedback and suggestions for improvements. 4) **Limited Trial**. After validation and product improvements, a limited trial is conducted with a small group of students at SMAN 12 Bandar Lampung. The limited trial aims to see how well the application functions and to identify any shortcomings or issues faced by users. During the trial, data is collected through direct observation, student interviews, and questionnaires regarding comfort and application effectiveness. 5) **Product Revision**. Based on the results of the limited trial, the application is revised to fix the identified weaknesses. Revisions may include changes to the user interface design, improvements to security features, or enhancements to application performance. 6) **Field Trial**. After the product revisions, a wider trial is conducted at SMAN 12 Bandar Lampung involving all students participating in the exam. The field trial aims to test the application under real conditions and assess how effective it is in preventing academic dishonesty. Data

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collected includes exam results, feedback from students and teachers, and an analysis of the effectiveness of security features in preventing cheating. 7) **Evaluation and Refinement**. Based on the results of the field trial, an evaluation of the developed Android-based CBT application is carried out. The evaluation covers aspects such as functionality, security effectiveness, and its impact on exam integrity. Finally, final refinements are made to the application, making it ready for full implementation at SMAN 12 Bandar Lampung.

This study also employs a quantitative approach with an experimental research design. The experimental research is conducted to test the effectiveness of implementing an Android-based CBT system in preventing academic dishonesty. The study compares the level of academic dishonesty before and after the implementation of the Android-based CBT system. The research is conducted at SMAN 12 Bandar Lampung, with the study population consisting of all 10th-grade students at SMAN 12 Bandar Lampung, totaling 350 students who participate in exams using the Android-based CBT system. The research sample is selected using purposive sampling by choosing several classes at SMAN 12 Bandar Lampung. The research instruments include: 1) A questionnaire containing questions about students' and teachers' experiences with the implementation of the Android-based CBT system. 2) An observation guide to observe the exam process, supervision, and students' interaction with the Android-based CBT application during the exam.

The data obtained from the survey and observations will be analyzed using descriptive statistical techniques to describe students' and teachers' perceptions (M Guntur dan Martha dkk, 2023). A t-test will be used to determine whether there is a significant difference in the level of academic dishonesty before and after the implementation of the Android-based CBT system.

Results and Discussion

1. Results of Android-Based CBT Application Development

The development of the Android-based Computer-Based Testing (CBT) application followed several stages: needs analysis, product design, expert validation, limited trial, product revision, and field testing.

The developed application, named **CBT Secure Exam**, includes the following main features:

- **Screen Lock (Kiosk Mode):** Restricts student access solely to the exam application, preventing the opening of other apps or browsers during the exam.
- **Randomization of Questions and Answers:** Questions and answer options are randomized for each participant, reducing the opportunity for collaboration among students.
- **Activity Tracking:** The system records suspicious activities, such as attempts to exit the application or sudden loss of connection.
- **Dynamic Time Limits:** Each question is managed with an automatic timer to prevent students from intentionally prolonging their time.

2. Results of Expert Validation

The validation process was conducted by:

- **Content Experts:** Subject teachers who assessed the appropriateness of the exam content and the accuracy of the difficulty levels.
- **Media Experts:** Educational technology lecturers who assessed technical aspects and application design.

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The validation results showed:

- The content feasibility assessment by the content experts achieved an average score of **88%** (categorized as *highly feasible*).
- The technical and media assessment by the media experts achieved an average score of **90%** (also categorized as *highly feasible*).

Both groups provided minor suggestions for improvements, including enhancing the user interface design and structuring questions according to progressive difficulty levels (*scaffolding*).

3. Results of Limited Trial

A limited trial was conducted with 30 eleventh-grade students at SMAN 12 Bandar Lampung. Observations and survey results indicated:

- **93% of students** found the application easy to use.
- **87% of students** stated that they could not open other applications during the exam.
- **91% of students** agreed that the randomization of questions made the exam feel fairer.

Some students experienced minor initial difficulties related to login and navigation; however, these issues decreased after a simple user guide was introduced at the start of the application.

4. Results of Field Testing

Field testing involved all eleventh-grade students (a total of 210 students) during the semester examination using the application.

The results showed:

- Attempts to open other applications during the exam **decreased by 95%** compared to the previous year's conventional CBT implementation (data based on application activity logs and supervisor reports).
- **94% of students** reported that the system helped them stay more focused during the exam due to the absence of distractions from other apps.
- Exam supervisors reported a more conducive exam environment, with a significant decrease in the need for manual interventions against students attempting to cheat (Borg, W. R., & Gall, 2003).

2. Data Analysis Results

Table 1. Survey Results of Student and Teacher Perceptions toward the Implementation of Android-Based CBT

No	Evaluated Aspect	Student Response (%)	Teacher Response (%)
1	Exams are fairer and reduce cheating	87%	80%
2	Exam supervision becomes more effective	82%	80%
3	Security features prevent the use of other apps	75%	78%
4	Technical issues during exams (e.g., app crashes)	15%	10%

Table 2. Observation Results During Android-Based CBT Exams

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No	Observed Aspect	Observation Results
1	Students opening other applications during exams	Not found
2	Whispering or sharing answers behavior	Greatly reduced compared to paper-based exams
3	Teacher focus during supervision	Increased due to simpler monitoring
4	Application stability during exams	Mostly stable, with minor technical issues

Pretest Results:

There was no significant difference in the tendency toward academic cheating between the experimental and control groups before the intervention (sig. > α = 0.05), indicating that both groups were in an equivalent initial condition.

Posttest Results:

After the implementation of the Android-based CBT, the experimental group showed a significant decrease in the tendency toward academic cheating compared to the control group (sig. < 0.05). The average scores of cheating tendency were as follows:

- ✓ **Experimental Group:** decreased from 75.4 to 42.7
- ✓ **Control Group:** decreased from 74.8 to 68.5

Activity Log Results: The data showed that in the experimental group, only **5%** of students were detected attempting to exit the exam application, whereas in the control group, **24%** of students were found opening other applications during the exam.

Discussion

The development of the Android-based Computer-Based Test (CBT) application has proven effective in significantly reducing the potential for academic dishonesty during examinations. Expert validation confirmed that the product meets the required feasibility standards from both content and technical perspectives (Suryani, M., & Yuliana, 2021) . The implementation of features such as *kiosk mode* and randomization has greatly contributed to maintaining the integrity of the examination process. A 95% reduction in cheating attempts highlights that restricting access to other applications is a critical innovation in the administration of digital exams. Furthermore, the randomization of questions supports individualized testing, thereby limiting opportunities for collaboration among students.

The flexibility of the Android platform also facilitates broader adoption of the application, considering that most students already use Android-based devices. These findings are consistent with the study by (O'Keefe, B., & Gullo, 2018), which emphasized that enhanced CBT system security-through locking and activity-tracking technologies-can significantly reduce incidents of academic dishonesty. Challenges encountered during development included the need for devices that meet minimum specifications and the requirement for a stable internet connection to ensure smooth exam execution. Nevertheless, these challenges can be mitigated through the provision of technical guidance prior to exam implementation (Zhang, X., & Sun, 2022). Overall, this Android-based CBT application presents an innovative, secure, effective, and reliable solution for

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administering digital examinations, particularly in educational settings such as SMAN 12 Bandar Lampung.

The study's findings further demonstrate that the use of an Android-based CBT system equipped with security features effectively reduces both the potential and practice of academic cheating among students (Budiman, A., & Haryanto, 2021). The *kiosk mode* feature effectively restricted students' access solely to the examination application, thereby preventing them from seeking external information during tests (Prasetyo, A. R., & Wibowo, 2022). Meanwhile, the randomization of questions and answers successfully minimized the possibility of students collaborating to cheat (Zhou, Q., & Liu, 2020). A 43% average reduction in cheating tendencies within the experimental group demonstrates that appropriate technological interventions can enhance academic integrity. These results align with prior research by King and Case (2014), who found that the implementation of security measures in CBT environments can significantly foster academic honesty (Iyer, S. S., & Singh, 2020). Additionally, students in the experimental group reported feeling more focused and more motivated to study honestly, as they perceived themselves to be systematically monitored. Nevertheless, initial training for students on the use of the system and ensuring device readiness, along with a stable internet connection, remain crucial for the successful implementation of digital examinations.

Conclusion

Based on the results of the research and development, it can be concluded that: The developed Android-based CBT application successfully met the feasibility criteria in terms of both content and media, achieving an average validation score of 89%, thus being considered highly suitable for use in computer-based examinations. Security features such as kiosk mode, question and answer randomization, and activity tracking proved effective in preventing academic dishonesty. This is evidenced by a significant 95% reduction in cases of academic cheating attempts compared to previous conventional CBT exams. User acceptance of the application was very positive. The majority of students found the application easy to use, fair, and helpful in enabling them to stay more focused during examinations without external distractions. The implementation of the Android-based CBT system at SMAN 12 Bandar Lampung has been proven to enhance exam integrity and can serve as an innovative model for conducting fair and trustworthy assessment practices in the digital era.

Recommendation

Based on the research findings, several suggestions can be proposed as follows:

1. Further development can be carried out by adding additional supporting features, such as automatic analysis of suspicious student behavior and integration with Learning Management Systems (LMS).
2. Technical training should be provided to both students and teachers prior to exam implementation to ensure that all parties are familiar with the application's usage, thereby minimizing potential technical issues during examinations.
3. The implementation of the Android-based CBT system should be expanded to other grade levels or schools facing similar challenges, in order to promote secure and fair examination practices across various educational institutions.

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4. Schools need to pay attention to providing adequate devices and internet access, especially for students who do not have personal Android devices, to ensure that examinations can be conducted smoothly without obstacles.
5. Regular monitoring and evaluation of the CBT application's usage should be conducted to continuously improve the system's security and user experience, based on technological advancements and field needs.

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