ISSN : 2963-9158 E-ISSN : 2963-9166

Communautaire: Journal of Community Service

Vol. 04 No. 03 (2025) : 297-312

Available online at https://serambi.org/index.php/communautaire

CBT Exam Implementation Guidance for Students in Facing Digital-Based Assessments

Annisa Tri Ananda Dewi*, Moh. Rofik, Moh Holidi, Najiburahman, Hasan Baharun, Abdul Wahid Zaini, M. Aqil Fahmi Sajani

Universitas Nurul Jadid, East Java, Indonesia

Email: annisatrianandadewi9@gmail.com

Keywords:
Computer Based Test, Learning Evaluation, Students' Digital Readiness, Digital Transformation of Education

****Corresponding Author***

ABSTRACT

The development of digital technology necessitates a transformation in learning evaluation systems in schools, including at the junior high school level; however, many schools still rely on manual, paper-based examinations, resulting in limited student experience and insufficient digital readiness to face computer-based assessments. This condition potentially hinders students' ability to adapt to national computer-based assessments. This Community Service activity aimed to implement Computer-Based Test (CBT)–based examinations to improve students' digital readiness while enhancing the effectiveness and efficiency of learning evaluation in junior high schools. The implementation employed a participatory approach using the Action–Plan–Analyze–Reflect (APAR) strategy, which included needs analysis, planning, action through socialization, simulations, and CBT exam implementation, as well as reflection and evaluation involving teachers and students. The results demonstrated a significant improvement in students' digital readiness, as indicated by their ability to operate the examination system independently, increased self-confidence, and better understanding of digital device usage. In addition, the implementation of CBT benefited teachers and schools by reducing correction time, minimizing paper usage, and simplifying the management of examination result data. The program activity contributes positively to the digital transformation of learning evaluation and serves as an applicable and sustainable model for CBT implementation in junior high school settings.

Please cite this article in APA style as:

Dewi, A. T. A., Rofik, M., Holidi, M., Najiburahman, Baharun, H., Zaini, A. W., & Sajani, M. A. F. (2025). CBT Exam Implementation Guidance for Students in Facing Digital-Based Assessments. *Communautaire: Journal of Community Service*, *4*(3), 297-312. https://doi.org/10.61987/communautaire.v4i3.820

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INTRODUCTION

The rapid development of digital technology has brought significant changes to various aspects of life, including the education sector. Learning evaluation systems that were previously conducted manually have gradually shifted toward digital-based systems in response to the demands of the digital era and national education policies (Yusriani et al., 2025; Cahyaningsih et al., 2025; Saharani & Diana, 2024). Digital evaluation is increasingly emphasized to ensure efficiency, accuracy, and transparency in assessing student learning outcomes. However, in practice, many junior high schools (Sekolah Menengah Pertama/SMP) still rely on conventional paper-based examinations. This condition limits students' exposure to digital technology in evaluation activities and reduces their readiness to participate in computer-based assessments.

As a consequence, when students are required to take computer-based examinations such as the Computer-Based National Assessment (ANBK), many of them experience confusion and technical difficulties. These challenges indicate that students' digital readiness has not been optimally developed through regular learning evaluation practices (Ilahi et al., 2025; Wiranata et al., 2024). Therefore, the implementation of Computer-Based Tests (CBT) becomes increasingly important as an effort to equip students with essential digital skills from an early stage. In addition to enhancing students' digital readiness, CBT also offers significant benefits for schools and the educational community, including time efficiency, cost reduction, reduced paper usage, and improved management of examination results.

The main problem identified is the low level of digital readiness among junior high school students in facing computer-based examinations due to their limited experience with digital learning evaluations. Current evaluation practices that predominantly use manual systems do not provide sufficient opportunities for students to develop skills in operating digital devices optimally. Furthermore, teachers and schools also encounter challenges in administering examinations, such as lengthy correction processes, high paper consumption, and difficulties in managing assessment data. Several studies have shown that the implementation of CBT can improve evaluation efficiency and enhance students' digital literacy; however, its application at the junior high school level remains uneven and limited (Fauzi, 2025; Suyadnya, 2024). This situation highlights a gap between the increasing demands of digital evaluation systems and the actual digital readiness of students in schools.

Extensive research has been conducted on the implementation of Computer-Based Tests (CBT) to improve the effectiveness and efficiency of educational evaluation. Previous studies have demonstrated that CBT can simplify the processing of test results, reduce the potential for academic dishonesty, and increase accessibility in assessment implementation (Mafaza & Kurniawan, 2025; Nugraha et al., 2025). However, most existing studies focus on CBT implementation in higher education institutions or within specific subject

areas. In contrast, the present study emphasizes the application of CBT at the junior high school level, with a particular focus on improving students' digital readiness. The main objective is not merely to implement digital examinations, but to develop students' digital competencies as a foundation for facing technology-based assessments in the future.

This Community Service activity aims to implement CBT-based examinations as an applicable and contextual solution to address the digital readiness challenges faced by junior high school students. Specifically, this activity seeks to improve the digital readiness of students at Abdi Marier Junior High School in facing technology-based learning evaluations. Additionally, the program aims to support the school in developing a more effective, efficient, and environmentally friendly evaluation system. The scope of the activities includes needs analysis, planning and development of the CBT system, socialization and mentoring for students and teachers, implementation of CBT-based examinations, and evaluation and reflection on the outcomes of the program. Through this PKM activity, students are expected to gain direct experience in digital examinations, teachers are expected to benefit from more efficient evaluation management, and schools are expected to sustainably adopt digital assessment systems to enhance the quality of education within the school environment and the surrounding community.

METHOD

This Community Service (PKM) activity employed a qualitative approach using a participatory strategy, namely the Action–Plan–Analyze–Reflect (APAR) model (Fitriani, 2021; Helmi et al., 2024). This approach was selected because it emphasizes the active involvement of all stakeholders, particularly teachers, students, and school administrators, at every stage of the activity. The APAR strategy enables PKM activities to be implemented in a structured, reflective, and sustainable manner that is responsive to field conditions and participant needs.

The implementation stages consisted of four main phases. The Analyze phase involved identifying needs and problems through initial observations of manual examination practices and discussions with teachers and students regarding their level of digital readiness. The Plan phase focused on designing the CBT-based examination, which included selecting the CBT platform, preparing examination questions, determining the implementation schedule, and developing standard operating procedures (SOPs) for the exams. The Action phase involved the implementation of CBT-based examinations accompanied by technical assistance and mentoring for both students and teachers to ensure smooth execution. Finally, the Reflect phase consisted of reflection and evaluation activities conducted through discussions with school stakeholders to assess the effectiveness of the CBT implementation and to formulate follow-up improvements.

Data collection was conducted using a participatory method through the researchers' direct involvement throughout the entire activity process. Qualitative data were collected through observation, informal interviews, and documentation. Observations were carried out to assess students' and teachers' readiness in participating in and administering CBT-based examinations. Informal interviews with teachers and students were conducted to explore their experiences, perceptions, and challenges encountered during the implementation of CBT. Documentation, including activity photographs, field notes, and examination results, was used as supporting evidence to strengthen the findings.

Data analysis was performed using descriptive qualitative techniques by organizing data according to the APAR stages and interpreting field findings to obtain a comprehensive understanding of changes in students' digital readiness and the effectiveness of CBT implementation. The analytical instruments included observation sheets, interview guides, and reflection notes, which were analyzed through data reduction, data display, and conclusion drawing. The results of the analysis were then used as a basis for formulating recommendations for the sustainable development and implementation of CBT-based examinations in schools.

FINDING AND DISCUSSION

Initial Conditions for Implementing Exams in Middle Schools

The examination system at Abdi Marier Middle School was previously conducted entirely using a manual, paper-based approach. All stages of the examination process, including question duplication, distribution of answer sheets, and result correction, were performed manually. This practice led to several challenges, such as excessive paper usage, relatively long correction times, and limited opportunities for students to develop the ability to operate digital devices during examinations.

Most students were not yet accustomed to completing examinations using computers or mobile devices, which raises significant concerns given that the Computer-Based Minimum Assessment (AMBK) is administered digitally and simultaneously. Teachers also expressed apprehension that students would experience difficulties in adapting to computer-based assessments if they were not introduced to a CBT-based examination system at an early stage. These findings indicate a clear gap between existing manual learning evaluation practices and the demands of an increasingly digital national assessment system.

Figure 1. Implementation of Student Exams before using CBT

Figure 1 illustrates the implementation of student examinations prior to the adoption of the Computer-Based Test (CBT) system, which relied entirely on conventional paper-based methods. The figure depicts students completing examination questions manually using printed question and answer sheets in a classroom setting. All stages of the examination process, including the distribution of questions, completion of answer sheets, and collection of results, were conducted without the support of digital technology. This condition reflects the limited utilization of technology in the learning evaluation process, as students had not yet been accustomed to interacting with computer-based examination systems. Furthermore, this conventional examination model presents several challenges, such as excessive paper usage, inefficiencies in correction time management, and low levels of student digital readiness for computer-based assessments.

A consistent pattern of problems was identified in the implementation of manual examinations at Abdi Marier Middle School. The main issues observed include delays in grade processing due to time-consuming manual correction procedures, which result in late announcement of examination results. In addition, the manual assessment process is prone to human error in checking and recording scores, potentially affecting the accuracy and reliability of exam results. Limited resources also pose a significant challenge, as monitoring, correcting, and recording examination results require substantial manpower and time, thereby increasing the workload of teachers and exam supervisors.

Planning the Implementation of CBT-Based Exams

In response to these issues, the PKM team collaborated with the school to develop a comprehensive plan for implementing a Computer-Based Test (CBT) examination. The planning phase was carried out using a participatory approach through coordination with the school principal and teachers, particularly in assessing facility readiness, determining examination schedules, and establishing CBT implementation mechanisms. In addition, the PKM team conducted an initial assessment of students' digital literacy levels as well as the readiness of the human resources involved to ensure the effective execution of the CBT system. This planning process included the development of technical procedures, the

selection of appropriate software platforms, and the formulation of strategies to anticipate potential technical challenges during the examination. Through careful and collaborative planning, the implementation of CBT is expected not only to run effectively but also to contribute continuously to the improvement of students' digital readiness.

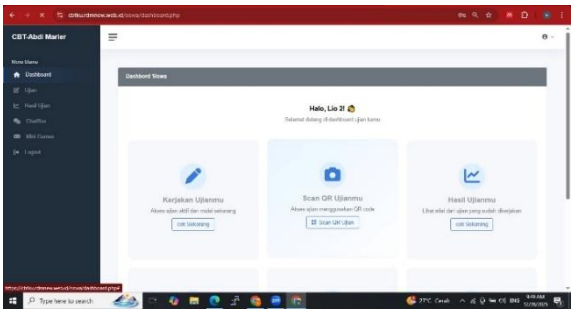

Figure 2. Computer Based Test (CBT) application used by students

Figure 2 illustrates the Computer-Based Test (CBT) application used to support digital-based examinations in schools. The application is designed with two integrated access modes, namely the proctor CBT and the student CBT, each serving distinct but complementary functions to ensure the effectiveness, fairness, and smooth implementation of the examination process. The proctor CBT functions as the central control system for exam administration. Its features include the creation and uploading of examination questions, enabling teachers or proctors to systematically organize test items, manage subjects, and schedule examinations. In addition, the proctor CBT provides real-time monitoring capabilities that allow exam supervisors to track student participation, monitor progress on test items, and observe student activity throughout the examination. The proctor CBT also includes an exam time management feature, which enables supervisors to regulate the duration of the examination and ensure that it runs according to the predetermined schedule.

Meanwhile, the student CBT interface is designed to prioritize ease of use and user comfort. Through this application, students can access examination questions directly, respond using a simple and responsive interface, and manage their time independently with the support of an integrated timer. Upon completion and submission of the exam, students receive automatic score displays, providing immediate feedback and enhancing transparency in the learning evaluation process. The integration of the proctor CBT and student CBT not only improves the efficiency of exam administration but also strengthens assessment accountability and objectivity, while simultaneously enhancing students' digital readiness in facing technology-based evaluation systems.

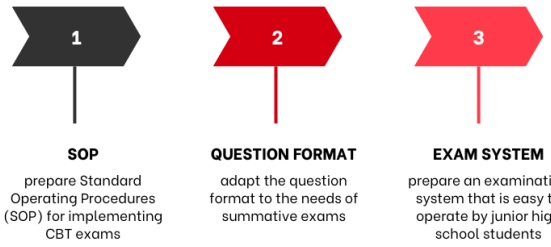

Figure 3. Planning Stage

Figure 3 illustrates the planning stage for the implementation of the Computer-Based Test (CBT), which focused on three main aspects: the development of Standard Operating Procedures (SOPs), adjustment of question formats, and preparation of the CBT examination system. In developing the SOPs, the PKM team formulated comprehensive technical guidelines governing the entire examination process, including the flow of exam activities, the distribution of roles and responsibilities between teachers and the implementation team, regulations on the use of equipment, and exam time management procedures. These SOPs were designed to ensure that the CBT implementation would be conducted in an orderly, standardized, and policy-compliant manner, while also providing clear guidance for all parties involved.

The second aspect of the planning stage involved adjusting the examination question formats to meet the requirements of summative assessments within a CBT environment. The PKM team collaborated with subject teachers to modify question formats to ensure compatibility with the CBT system, including the selection of appropriate item types, the determination of time allocation for each test, and the clarity and readability of questions displayed on computer screens. These adjustments were intended to ensure that the assessment instruments continued to accurately measure student learning outcomes without reducing the substance or quality of the tested material.

The third aspect focused on preparing the CBT examination system to align with the characteristics and needs of students at Abdi Marier Middle School. The system was designed to be user-friendly, featuring a simple interface, clear navigation, and stable performance throughout the examination process. Special attention was given to system reliability and ease of operation to minimize technical disruptions and ensure a comfortable testing experience for students. Through careful preparation of these three aspects, the planning phase aimed to support the effective implementation of CBT-based examinations, reduce potential technical obstacles, and enhance student confidence during the exam process.

In addition to planning systems and procedures, the PKM team developed a mentoring and capacity building program for students and teachers before the implementation of CBT which included socialization activities, technical training, and simulations to familiarize participants with the CBT environment,

so that students were expected to understand the exam flow, system operating procedures, and time management strategies in answering questions to reduce anxiety and minimize technical errors during the exam; at this planning stage, it was also emphasized to strengthen the coordination and technical readiness of the exam committee through collaboration between the PKM team and teachers in conducting a thorough check of the availability of devices, network stability, and the condition of the exam room, as well as being the basis for developing mitigation strategies to anticipate potential technical disruptions such as network failures or device damage, so that the implementation of CBT could run according to schedule and was expected to be able to create a learning evaluation process that was more effective, efficient, and adaptive to developments in educational technology.

Implementation of CBT Exams

The action phase was carried out through outreach activities and CBT examination simulations for students. These activities were designed to familiarize students with the CBT system, including the interface, login procedures, methods for answering questions, and the digital submission of responses. Continuous guidance and technical assistance were provided to ensure that students felt comfortable, secure, and confident when operating digital devices during the examination process.

The implementation of the CBT-based summative examination proceeded smoothly, with students successfully completing all stages of the exam in accordance with established procedures. Teachers served as exam supervisors and mentors, while the PKM team provided ongoing technical support throughout the examination. From a technical perspective, the use of CBT significantly improved the efficiency of exam administration and result management. Examination scores were generated automatically by the system, thereby reducing the time and workload required for manual grading by teachers.

During the action phase, students demonstrated notable improvements in their ability to operate digital devices independently, particularly in navigating the examination system and managing their time effectively during the exam. Students also displayed increased discipline and focus, as the CBT system restricted access to non-examination-related features. This contributed to a more controlled, structured, and conducive examination environment.

In addition to the positive impact on students, the implementation of CBT also provided benefits for teachers and the school. Teachers gained practical experience in managing technology-based learning evaluations, which contributed to the enhancement of their digital competencies. The CBT implementation represents an important initial step toward integrating digital technology into ongoing learning evaluation systems and supports broader efforts toward digital transformation within the educational environment.

Figure 4. Students Taking Computer Based Test (CBT) Exams

Figure 4 illustrates the implementation of a Computer-Based Test (CBT) examination conducted in the examination room, where students completed exam questions independently using computers in a structured and orderly manner in accordance with digital-based examination procedures. The implementation of CBT reflects the integration of information technology into the learning evaluation process while simultaneously fostering students' digital readiness in terms of device operation, time management, and adherence to examination rules. Through CBT-based examinations, students become accustomed to interacting directly with digital systems, thereby increasing their confidence and preparedness to face technology-based learning evaluations.

As shown in Figure 4, the CBT-based examination also serves as a medium for familiarizing students with technology-oriented assessment patterns. During the examination process, students are trained to independently manage each stage of the test, including reading on-screen instructions, navigating the examination system, and ensuring that their responses are properly saved before the allotted time ends. This familiarization not only enhances students' technical competencies but also cultivates responsibility, accuracy, and discipline in completing digital-based academic assessments, which are increasingly relevant in the development of modern educational evaluation systems.

The implementation of CBT during the action phase provides authentic learning experiences for both students and teachers in conducting evaluations that are effective, efficient, and adaptive to technological advancements. The results of the examination indicate that students were able to adapt well to the digital system used, while teachers gained practical insights into the potential of CBT as an alternative evaluation method for future implementation. Thus, CBT functions not only as an assessment tool but also as a strategic effort to enhance the digital readiness of the school community and to promote a learning culture aligned with the demands of the digital era.

Evaluation and Reflection on CBT Implementation

The reflection phase was conducted through post-examination discussions with teachers and students following the implementation of the CBT-based examination. The evaluation results indicated that the implementation of

CBT was effective in improving the overall quality of learning evaluation. The examination process became more organized, transparent, and accountable, reflecting better management and control compared to the previous manual system.

In terms of efficiency, the use of CBT significantly reduced paper consumption, shortened the time required for grading, and simplified the management of examination data. From the perspective of student preparedness, this activity provided valuable hands-on experience that helped students prepare for future computer-based assessments. Although minor challenges were encountered, particularly related to students' initial adaptation to digital devices, these issues were successfully addressed through continuous mentoring and repeated simulation activities. Overall, this PKM activity demonstrated a positive impact and served as a strategic step toward supporting the digital transformation of learning evaluation at the junior high school level.

The reflection phase played a crucial role in assessing the sustainability of the program. Based on discussions and direct observations during the activity, it was concluded that the implementation of CBT-based examinations not only affected the technical aspects of learning evaluation but also contributed to a shift in the mindsets of both students and teachers regarding the use of educational technology. This experience demonstrates that digital readiness can be developed progressively through careful planning, continuous mentoring, and active collaboration between schools and the implementation team. Therefore, it is recommended that CBT implementation be continuously developed and gradually integrated into school evaluation systems as part of a long-term strategy to strengthen sustainable digital transformation in learning evaluation. The graph in Figure 5 shows the student readiness scores before and after implementing CBT.

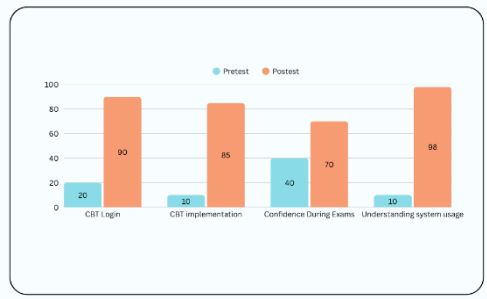

Figure 5. Student Readiness Indicator Graph

Table 1. Comparison of Students' Digital Readiness Before and After the Implementation of CBT-Based Exams

Student Readiness Indicators	Before CBT Implementation	After CBT Implementation
Able to log in independently	A small number of students	Almost all students
Able to work on CBT questions	Many need help	Independent with minimal assistance

Able to send answers	Don't understand yet	Already understand well
Confidence during exams	Low	Increase
Understanding system usage	Low	Significant increase

Based on the data presented in Table 1, student readiness showed a significant improvement across all measured indicators following the implementation of the Computer-Based Test (CBT). Prior to the CBT implementation, most students experienced difficulties in operating the examination system, as reflected in their limited ability to log in independently and their high dependence on tutors when answering exam questions. These conditions indicate that students' initial level of digital readiness was relatively low and required intensive assistance. After the CBT implementation, substantial improvements were observed in students' technical competencies. Nearly all students were able to log in independently, complete the examination with greater autonomy, and understand the procedures for submitting answers digitally. This improvement demonstrates that students were able to adapt effectively to the technology-based examination system through structured socialization, simulations, and mentoring conducted during the PKM activities.

The implementation of CBT also had a positive impact on students' psychological aspects. Students' confidence levels during the examination increased markedly, accompanied by a better understanding of how to use the CBT system in addition to technical improvements. This finding suggests that familiarization with CBT not only enhances students' digital skills but also fosters a sense of security and comfort when engaging in technology-based learning evaluations. These results reinforce the conclusion that CBT implementation contributes positively to improving students' digital readiness in a comprehensive manner, encompassing both technical and psychological dimensions.

Discussion

The implementation of Computer-Based Tests (CBT) within the Community Service (PKM) activities at SMP Abdi Marier represents a paradigm shift in learning evaluation, transitioning from conventional paper-based assessments to a digital system that is more adaptive, efficient, and aligned with the demands of evolving educational technology (Antonopoulou et al., 2025; Dao et al., 2025; Robandi et al., 2025). In this context, CBT is not merely positioned as a technical substitute for written examinations, but rather as a pedagogical intervention instrument deliberately designed to improve students' digital readiness. Through CBT implementation, students are assessed not only on academic achievement but are also trained in fundamental digital competencies, time management, and independent engagement with technology-based evaluation processes. Consequently, CBT contributes directly to the development

of 21st-century competencies and becomes an integral component of the school's efforts to support the ongoing digital transformation of learning evaluation.

Key findings from this PKM activity indicate that the success of CBT implementation is strongly influenced by mentoring strategies and system design tailored to user characteristics. A CBT system designed with a simple interface and a structured examination flow enables students to complete assessments independently without excessive cognitive load. This finding confirms that students' digital readiness is shaped not only by the availability of technology but also by the alignment between system design and users' capacities. From a learning perspective, CBT functions as a habituation medium for digital evaluation practices. Students' repeated interactions with the CBT system during examinations facilitate the development of practical procedural competencies, such as system-based time management, independent decision-making, and responsibility for the examination process and outcomes. These competencies are essential in preparing students for large-scale computer-based assessments at the national level.

Furthermore, the implementation of CBT has significant implications for the quality of learning evaluation management. Automated assessment processes and integrated documentation of examination results promote a more objective, transparent, and accountable evaluation system (Ali, 2024; Kusumawati, 2025; Najiburohman et al., 2025; Syafiih, 2025). This contributes to strengthening evaluation governance at the school level while simultaneously reducing teachers' administrative workload without compromising the substance and validity of assessment (Beames et al., 2021; Caena & Redecker, 2019; RJ et al., 2025). Importantly, CBT has demonstrated its effectiveness as a sustainable intervention model. The transfer of technical knowledge and practical experience to teachers and students enables schools to operate the system independently after the PKM program concludes. Thus, CBT implementation does not merely function as a short-term output of community service activities but evolves into an internalized evaluation practice within the school's learning system.

The findings of this PKM activity are consistent with previous studies indicating that CBT implementation positively influences the effectiveness of learning evaluation and students' digital readiness (Roza et al., 2025; Syahputra et al., 2025). Prior research has shown that computer-based examinations enhance assessment efficiency, accuracy, and transparency compared to conventional paper-based tests (Saidah & Muhid, 2025; Yusuf, 2025). Other studies also confirm that repeated student engagement in digital assessments improves technological literacy, reduces anxiety related to device usage, and builds confidence in facing system-based evaluations (Ataman et al., 2024; Santika, 2025; Lailiyah et al., 2022). These findings further strengthen the results of this PKM activity, in which improvements in both technical and psychological aspects of students' digital readiness were clearly evident following CBT implementation.

The success of CBT implementation is closely linked to several supporting factors, including infrastructure readiness, teachers' digital competencies, and continuous mentoring strategies (Ansori et al., 2025; Saputra et al., 2025). CBT initiatives implemented without adequate socialization and simulation tend to generate resistance and confusion among students, particularly at the junior high school level. Therefore, the participatory approach adopted through collaborative planning, gradual simulations, and intensive mentoring aligns with recommendations from previous studies that emphasize the importance of managerial and pedagogical dimensions in successful digital evaluation transformation. The implementation of CBT at school is not only practically relevant but also holds strong academic legitimacy as a model for developing technology-based learning evaluation in secondary education.

CONCLUSION

Community Service (PKM) activities through the implementation of Computer-Based Test (CBT) examinations at Abdi Marier Middle School demonstrate that the digitalization of learning evaluation can significantly enhance the effectiveness, efficiency, and overall quality of the assessment process. The adoption of CBT successfully addressed various challenges associated with manual examinations, including delays in score processing, the potential for assessment errors, and the heavy administrative workload borne by teachers. From the students' perspective, CBT implementation had a substantial impact on improving digital readiness, as reflected in their ability to log in independently, complete and submit answers autonomously, increased self-confidence, and improved understanding of the examination system. These findings confirm that CBT functions not only as an academic assessment tool but also as a pedagogical instrument that supports the continuous development of students' digital competencies.

Although this PKM activity yielded positive outcomes, its scope remains limited and primarily focuses on students' digital readiness. Future community service initiatives and research are recommended to involve a broader range of schools and to examine the impact of CBT implementation on learning outcomes, student motivation, anxiety in computer-based assessments, as well as school management and institutional policies, so that CBT can be optimized as an integral component of sustainable educational transformation.

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