Utilization of Computer-Based Testing Technology to Optimize Cognitive-Based Assessment Literacy in the Learning of Islamic Elementary School Students

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Abstract

The focus of 21st-century learning is on developing students' critical thinking, real-world application of knowledge, mastery of information technology, communication, and collaboration skills. Therefore, it is important to integrate information technology into the learning process and assessment of learning outcomes. This research aims to explore how Computer-Based Testing (CBT) can enhance the quality of cognitive assessment procedures based on literacy and improve learning evaluations for students at Islamic Elementary School. This study adopted a qualitative case study design and was conducted at Islamic Elementary School Al Wathoniyah 10 East Jakarta in the second semester of the 2023/2024 academic year. The researcher used interviews, observations, and documentation as data collection methods. The findings of this research show that literacy-based cognitive assessment using CBT can optimize the quality of learning evaluation. Teachers and students are accustomed to using information and communication technology devices in learning activities. There are five stages of the procedure in literacy-based cognitive assessment using CBT to optimize the quality of learning evaluation, including the planning stage, item question development stage, validation stage, implementation stage, and evaluation stage. The investigative conducting procedure truly optimizes the quality of learning evaluation. Islamic Elementary School Al Wathoniyah 10 utilizes CBT, which has literacy-based characteristics.

CBT used in learning evaluation is equipped with meaningful stimuli and various forms of questions. The questions in CBT are made as similar as possible to the national assessment questions. The educational report results in the 2023 national assessment, especially in the cognitive domain, have shown improvement. The literacy and numeracy skills of students at Islamic Elementary School Al Wathoniyah 10 have achieved good and moderate results. Both have obtained top rankings nationally.

Keywords: Computer Based Test; Cognitive Assessment; Literacy; Islamic Elementary School; Technology

INTRODUCTION

As we enter the 21st century, science and technology(Subroto et al., 2023) are developing at an increasingly rapid pace(Effendi & Wahidy, 2019). Addressing these advancements in science and technology requires specific strategies, particularly in the educational environment (Subroto et al., 2023), to ensure high-quality learning (Mufliva & Permana, 2024). It is crucial to take concrete steps to prepare the current generation (Widodo, S., & Wardani, 2020) so that students from elementary school to tertiary level can master both soft and hard skills (Sriyanto, 2021). The 21st century, often referred to as the century of knowledge (Hasibuan & Prastowo, 2019), has transformed the way of life in comparison to previous eras (Muhamad Zulfikar Mansyur, Elfira Rahmadani et al., 2022). 21st-century learning places more emphasis on students' abilities to think critically (Mashudi, 2021), connect scientific knowledge with the real world (Hamdani et al., 2019), master information technology (Muhamad Zulfikar Mansyur, Elfira Rahmadani, et al., 2022), communicate effectively (Prayogi & Estetika, 2019), and collaborate with others(Hermansyah, 2020).

To support 21st-century skills, there are six basic literacies, including literacy, numeracy, scientific literacy, financial literacy, culture and civic literacy, and information and communication technology (ICT) literacy(Jauharin & Cahyaningsih, 2023) that are essential for students(Yudiana et al., 2023). The continuous advancement of science and technology is constantly changing society(Maritsa et al., 2021), including in the field of education(Agustian & Salsabila, 2021). Education needs to be at the forefront of these changes(Savira, 2024) to create superior human resources (Puspa et al., 2023) who can compete in the global community (Mukaromah, 2020).

The advancement of information technology has been beneficial in the field of education and has the potential to improve the quality of education(Praditiya Purnama et al., 2023). The utilization of information and communication technology in learning is believed to enhance the quality of teaching(Siregar & Marpaung, 2020), develop the information and communication technology skills needed by

students for their future work and life(Mukaromah, 2020), broaden access to education and learning(Effendi & Wahidy, 2019), streamline lesson planning(I. Febrianti et al., 2023), and improve the cost-benefit ratio in education(Saepudin, 2019). Therefore, educators are expected to creatively and innovatively utilize information and communication technology(Ambarwati et al., 2022). The developments in this digital era should be able to maximize the application of technology. Technology can be utilized in several educational aspects, either as a medium or a tool to assess students' cognitive domain(Salfadilah et al., 2023). Educators should always keep learning to keep up with the times and be able to use interactive(Utomo, 2023) learning media(Sartika et al., 2020). One of these is the selection of digital learning media to make it more engaging, including in the form of evaluation(Larasati et al., 2023).

Evaluation in the world of education is referred to as learning evaluation. Educators are required to evaluate the learning they provide to students (Resa & Nopiyad, 2022). Educational evaluation is the process of collecting and processing information to determine the achievement of student learning outcomes (Idrus, 2019). Evaluation is a collection of data used to determine to what extent and how educational goals are achieved (Zalillah & Alfurqan, 2022). Evaluation is a process or action to determine the value of students' learning success after carrying out the learning process (I. Febrianti et al., 2023). Earning evaluations that are integrated with the Internet will certainly make it easier for teachers to implement them (Husna & Yulisetiani, n.d.).

The use of online evaluation media is not only to facilitate evaluation but also to increase students' interest and learning outcomes (Candra Rolisca & Achadiyah, 2014)(Imam Tanthowi, Mahsup, Lola Wahyu Utami, Nanda Salsabilah, Nurul Iqamah & Tias Azizah Awalia, Siti Malikah, Suryati, Atina Haer, 2022). However, if students' interest in carrying out the evaluation process is lacking, then teachers will also find it difficult to measure their abilities (Larasati et al., 2023). The FT teacher, as the educational coordinator of Islamic Elementary School Al Wathoniyah 10, stated that the learning evaluation at her school utilized information technology in the form of CBT (Computer Based Testing). The FT teacher further said, "Alhamdulillah, Islamic Elementary School Al Wathoniyah 10 has used Computer Based Tests to evaluate learning." said the FT teacher" (Guru FT, 2024). The use of CBT-based learning evaluation at Islamic Elementary School Al Wathoniyah 10 is carried out not only in summative assessments but also in daily assessments. Budget efficiency and the effectiveness of teacher administrative work are the background for implementing CBT-based learning evaluation at Islamic Elementary School Al Wathoniyah 10

The use of Computer-Based Testing (CBT) is very beneficial for teachers as it simplifies their tasks. With CBT, teachers no longer need to manually grade student assessments. Instead, the grades are immediately available, making the assessment

process more efficient. Additionally, CBT allows for easy access to digital records of student performance, which can be accessed by students, parents, and teachers at any time. This feature is particularly useful for schools during accreditation, as it provides a straightforward way to demonstrate student performance using the CBT application on the school e-learning platform (Guru FT, 2024).

Currently, to improve the quality of education, the government is implementing a national assessment program (Indahri, 2021). This national assessment program is usually called the Computer-Based National Assessment (ANBK)(Berlianto & Pembangunan, 2023). The Indonesian Ministry of Education, Culture, Research, and Technology implements the program. Apart from implementing ANBK, Islamic schools also take part in a similar assessment program organized by the Ministry of Religion. This program is usually called the Indonesian Islamic School Competency Assessment(AKMI) (Hidayat, 2023). The ANBK and AKMI programs are followed by grade 5 students as an honest diagnostic tool. National assessments no longer evaluate the achievements of individual students but map and evaluate educational units in the form of input, processes, and results(Rokhim et al., 2021). There are two competencies tested on ANBK, namely literacy and numeracy (Sobirin et al., 2024), while for ANBK, there are four competencies tested, namely reading literacy, numeracy literacy, scientific literacy, and socio-cultural literacy (Mamlu'ah et al., 2024).

The results of AKMI report cards for Islamic Elementary School Al Wathoniyah 10 students show satisfactory results. Namely, they are at a proficient level in all literacy. This shows that students have been able to achieve all the competencies tested in AKMI. In the ANBK results, Islamic Elementary School Al Wathoniyah 10 also experienced a significant increase. In the field of literacy, the results of the ANBK report card increased by 36.85% from a score of 63.33 in the previous period to 86.67 with a good predicate, and the description of the achievements of most students had reached the minimum competency limit for reading literacy. In the field of numeracy, the ANBK Islamic Elementary School Al Wathoniyah 10 results also increased by 200.04%. The score obtained in 2022 was 23.33, increasing to 70 in the following year, said the head of the Islamic Elementary School Al Wathoniyah 10 (SYH, 2024).

The feedback from interviews with education coordinators and full-time teachers indicated that students at Islamic Elementary School Al Wathoniyah 10 did not encounter any difficulties or surprises when facing literacy-based national assessment questions despite the different formats of the questions. The students are accustomed to these assessment models. Additionally, the emphasis on information technology-based programs in the schools supports teaching and learning activities, developing students' proficiency in using information technology. The school e-learning system has contributed to students' competence in using information technology. (Guru FT, 2024). Furthermore, the implementation

of computer-based tests (CBT) at Islamic Elementary School Al Wathoniyah 10 since 2021 has been beneficial. All students from class 1 to class 6 have utilized this form of assessment, which measures student skill achievement using computer media. Computer-based testing (CBT) at Islamic Elementary School Al Wathoniyah 10 has unique characteristics. The questions are designed with literacy-based stimuli and come in various forms. The stimuli include long and complex texts, as well as valuable pictures, comics, diagrams, and infographics. The questions include multiple choice, complex multiple choice, true or false, and matching. The aim is to make the questions and stimuli as similar as possible to the national assessment. They are presented in an interesting and inspiring way to create new and meaningful experiences for students. This research focuses on using literacy-based CBT technology to optimize learning evaluation.

Recent research has demonstrated that creating assessment tools for learning outcomes using computer-based tests allows teachers to efficiently (Adam & Hasni, 2023) and effectively replicate learning outcomes for students (Novrianti, 2014). The use of computer-based tests for assessment yields valid, effective, and practical results (Agusta, 2022). It is anticipated that teachers will regularly utilize these tools for assessing learning outcomes in daily tests, mid-semester exams, and final semester exams (Adam & Hasni, 2023). Dwi Lestari's research findings indicate that Computer-based Tests (CBT) can be used to assess students' cognitive abilities (Lestari, 2019). Rahmad Hidayat's study concluded that developing CBT questions using the Wondershare Quiz Creator application for Class VIII Middle School Social Sciences is suitable for learning assessment and can serve as reference questions in daily assessments and learning evaluations (Hidayat, 2023). According to the research conducted by(Wulandari et al., 2022), domino card media can be used to improve learning evaluation, especially in the cognitive domain of early childhood.

Previous studies have indicated the effectiveness of using CBT for assessing learning and producing valid learning outcomes. Suitable learning media such as domino cards can be used to improve learning assessment in the cognitive domain. This research aims to determine how cognitive assessment procedures based on literacy using Computer Based Test (CBT) can optimize the quality of learning assessment for Islamic Elementary School students. The findings of this research are expected to contribute to schools using CBT for assessment to enhance the quality of learning assessment. In addition to optimizing the quality of student learning assessment, CBT can also be used to streamline the planning and implementation of learning, reduce administrative burdens, and save time and costs in creating literacy-based assessment questions.

METHOD

The research utilized a qualitative approach with a case study method. The qualitative case study research procedure emphasizes deep data exploration to examine in detail the "boundary system" of a single case or multiple cases(John W. Creswell, 2023). Researchers are interested in conducting this research because of the opportunities available at Islamic Elementary School Al Wathoniyah 10. Being in the diverse Jakarta area, the school is encouraged to emphasize ICT-based learning, particularly through the use of CBT in school e-learning to optimize learning evaluation. The research was conducted at Islamic Elementary School AL Wathoniyyah 10, East Jakarta, during the second semester of the 2023/2024 academic year. The researcher collected data through interviews, observations, and documentation from research subjects, including the education coordinator, the head of the school, and 47 fifth-grade students, comprising 23 boys and 24 girls.

Table 1. Source Data

No	Initial	Position
1.	Guru FT	Teacher Teacher Coordinator for Education
2.	Guru SYH	Teacher, Head of School
3.	ASD	Fifth Grade Students

The researchers used structured interviews. Conducting an interview begins with preparing an interview instrument in the form of written questions to ask the respondent. The researchers also used participatory observation, following activities carried out during learning and evaluation, which were used as sources of research data. Documentation was carried out by looking for notes and activity plans and taking photos. Through documentation, the researchers were able to obtain clear and accurate explanations from the results of interviews and observations that had been carried out. The data analysis technique used in this research refers to the interactive model of Miles, Huberman, and Saldana.
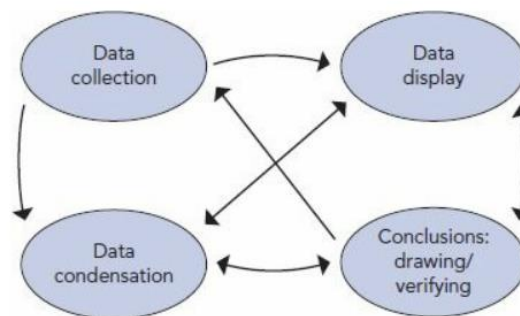

Figure 1.

Analysis Techniques

In Figure 1, we can see the interactive model for data analysis techniques developed by Miles, Huberman, and Saldana. After collecting all the data, the researcher analyzed it through the stages of condensation, presentation, and conclusion to produce comprehensive data. To ensure the validity of the findings, the researcher triangulated the data by matching information from interviews, observations, and documentation.

Result

1. Application of Information and Communication Technology (ICT) at Islamic Elementary School Al Wathoniyah 10 East Jakarta

Islamic Elementary School Al Wathoniyah 10 frequently incorporates information and communication technology to prevent children from being technologically illiterate. The teachers at Islamic Elementary School Al Wathoniyah 10 utilize information and communication technology to aid learning activities, including creating learning materials and assessing learning progress.

> The FT teacher mentioned that all the teachers at our school are well-versed in using information technology. We have sufficient IT facilities for our students, including computers, laptops, tablets, and cell phones. Our educational approach places a strong emphasis on IT-based learning. Consequently, our students are accustomed to engaging in interactive and enjoyable learning activities through school e-learning. Additionally, we have incorporated e-learning for assignment submissions, helping us reduce the use of paper in collecting assignments. (Guru FT, 2024)

The FT teacher is proficient in utilizing technology and information-based media for learning. As a result, the teacher frequently develops information technology-based learning materials and uses them to instruct students at Islamic Elementary School AL Wathoniyah 10. This includes utilizing media such as Kahoot, Quizizz, and Flippity Fun Class during the learning process.

One of the 5th-grade students expressed, "I was very happy when I heard the teacher announce that there would be an assessment. I am more confident when answering questions. The story is interesting" (ASD, 2024).

The teachers at Islamic Elementary School Al Wathoniyah 10 are very skilled in using information and communication technology. They employ different learning methods by creating educational and assessment tools to introduce students to technology use and enhance their critical thinking skills. For example, they use Computer-Based Training (CBT) for learning assessments through the school e-learning platform.

During cognitive assessments using CBT in school, teachers use the WiFi network and routers in each class. The signal is generally stable, so there are no significant obstacles during the assessments. Students use gadgets to work on questions, and they are allowed to bring cell phones to school as long as they have

communicated with their parents beforehand. Gadgets are specifically used for assessments and are collected by the class teacher before and after the assessments. The school also provides facilities such as laptops, cell phones, and tablets for students who do not have their own gadgets.

2. *Literacy-Based Cognitive Assessment Procedures Using Computer-Based Testing (CBT)*

Cognitive assessments using Computer-Based Testing (CBT) have been implemented at Islamic Elementary School Al Wathoniyah 10 in East Jakarta. This assessment method utilizes laptops, computers, tablets, and cellphones, assisted by the school e-learning system. The questions have been designed not only for summative assessments but also for daily assessments. Over the past two years, teachers at Islamic Elementary School Al Wathoniyah 10 have been using literacy-based assessment questions for daily assessments, with teachers creating their own questions. For summative assessments, a working group of heads of Islamic Elementary Schools in East Jakarta collaboratively generates the questions. These questions are developed with the expertise of top teachers sent by the head of the school, who have received training and guidance from one of the Islamic Elementary School Al Wathoniyah teachers involved in creating the national question instrument for assessing Indonesian Islamic school competency(Guru FT, 2024).

The interview with (Guru FT, 2024) states that the procedure or steps performed by teachers in creating literacy-based learning evaluation questions using CBT are as follows. First, the planning stage, the item question development stage, the readability test or validation stage, the implementation stage, and last, the evaluation stage. The initial step is the planning stage, where the teacher first creates a question framework, looks at the indicators of each subject, and then translates them into item question frameworks. The next step is for the teacher to develop items into various question formats. As for the indicators, the teacher must look at the IKTP (learning objective achievement indicators), which are then translated into question indicators. The indicators for creating questions should also direct students to think critically or at a high level. The time used by teachers at Islamic Elementary School Al Wathoniyah 10 to develop question items tends to be relative after the teacher has finished teaching activities. After the questions are completed, they are reviewed by another teacher and then revised if there are any inconsistencies in the writing of the questions and the indicators.

Before being used, the questions in the Computer-Based Test (CBT) are first validated or subjected to readability tests by teachers and students. Once the questions are deemed valid and suitable for testing, they can be given to students for daily assessments. Item analysis of the questions is also available in the CBT application at Islamic Elementary School Al Wathoniyah 10. So, after the test, the scores and the analysis results will be available. The item analysis provides scores

or marks, the time taken to complete, and whether the student's answers are correct or incorrect. Scoring guidelines are also automatically available in the application and depend on the questions that are tested. Item analysis is conducted to ensure that the questions continue to function effectively.

Test items that have undergone validation and have been deemed suitable can be used by students for assessment. The duration of the test varies depending on the subject being tested. For subjects that do not require a long time, the average duration given for 50 test items is 60-90 minutes. However, for mathematics, which requires more calculations and time, the test duration given is 120 minutes with fewer test items. Before conducting the assessment, the teacher provides prior information so that the students can prepare themselves. During the implementation stage, the teacher must ensure that all devices function properly, prepare equipment such as laptops and computers, and also ensure that the internet network is stable. During the assessment, each student is ready to use their respective devices. The students start the assessment together, monitored and assisted by the teacher. After completing the entire assessment, students are not allowed to leave the room until the assessment time is over.

To maintain the quality of the questions, teachers evaluate the items that have been added to the application. The questions are also improved and updated after analyzing the specific question items that appear after students have completed them. For questions that still have errors, such as typos, unclear images, ambiguous sentences, or items that do not match the indicators, the teacher can take action to revise, replace, or remove the question from the CBT application.
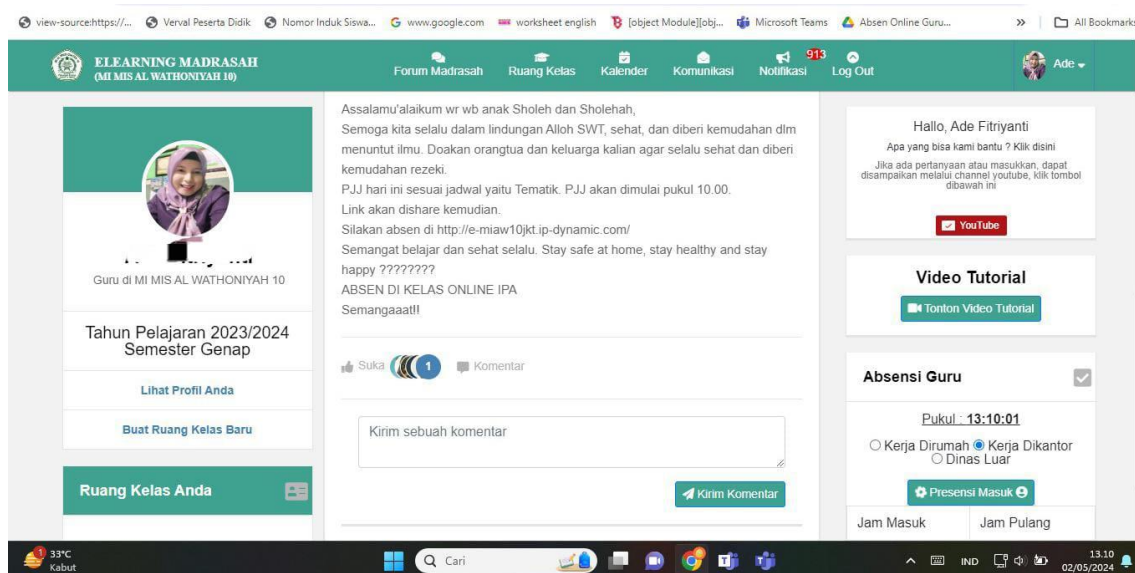

Figure 2.

Initial View of School E-Learning

The FT teacher at Islamic Elementary School Al Wathoniyah 10 mentioned that the teachers had prepared five types of questions for the assessment. These include short answers, multiple choice, complex multiple choice, matching, and true and false. The assessment includes stimulus questions based on literacy, which are in the form of fiction texts, informational texts, infographics, images, graphs, and comics. The teachers themselves have created the evaluation questions, which are not solely derived from the textbook.
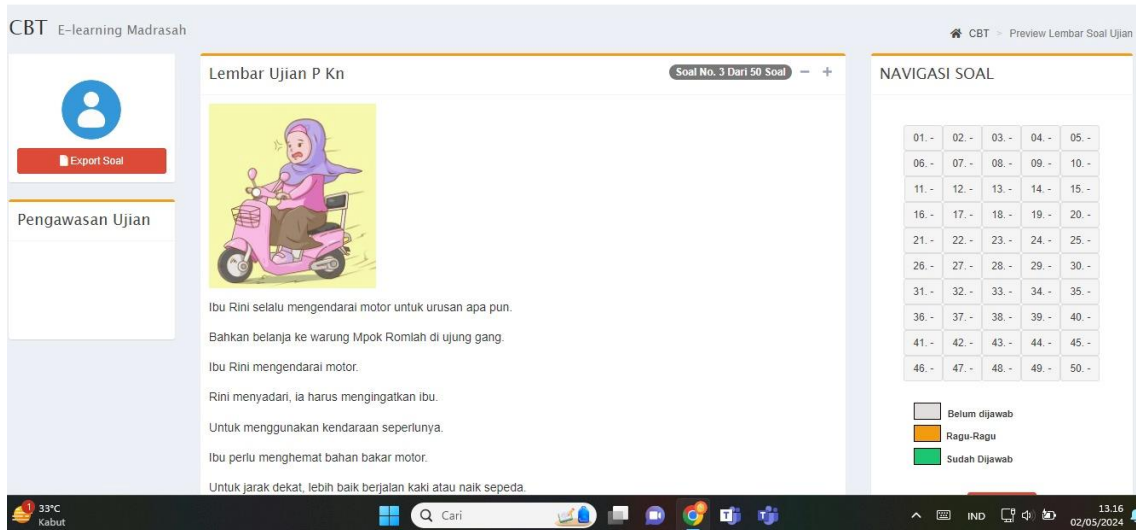

Figure 3.

Display of question stimuli in the form of images and fictional text

Figure 4.

Display of stimulus in the form of a comic

3. Computer Based Testing (CBT) to Optimize the Quality of Learning Evaluation

Assessment based on literacy using the CBT application at Islamic Elementary School AL Wathoniyah 10 can help optimize learning evaluations, especially in cognitive assessment. Students are accustomed to critical thinking in learning and answering formative and summative questions. Therefore, during the national assessment, students do not have much difficulty in answering questions containing long and complex readings. This is evidenced by the national assessment results report (educational report) issued by the Ministry of Education, Culture, Research, and Technology at Islamic Elementary School Al Wathoniyyah 10 in 2023, which showed an overall improvement.

The following are the results of the education report in diagram form. This report contains the achievements of all indicators, including the results of the national assessment (cognitive), character survey, and learning environment survey (Sulingjar).
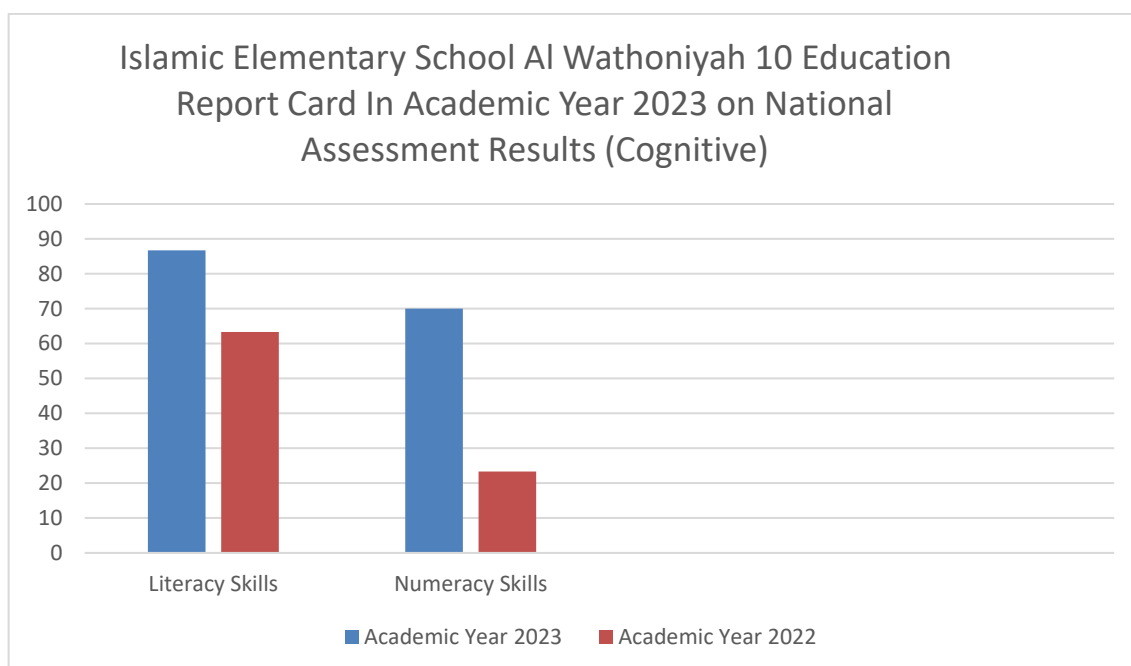

Figure 5.

Islamic Elementary School Al Wathoniyah 10 Education Report Card In Academic Year 2023 on National Assessment Results (Cognitive)

The image depicts an improvement in national assessment results, particularly in the cognitive domain, in the areas of literacy and numeracy skills. In terms of literacy, Islamic Elementary School Al Wathoniyah 10 experienced a 36.85% increase with a good level of achievement. Meanwhile, for numeracy skills, Islamic Elementary School Al Wathoniyah 10 also saw a 200.04% increase with a moderate level of achievement. The literacy and numeracy skills of Islamic

Elementary School Al Wathoniyah 10 have yielded satisfactory results as they fall within the top ranking (1-20% group of schools) nationally.
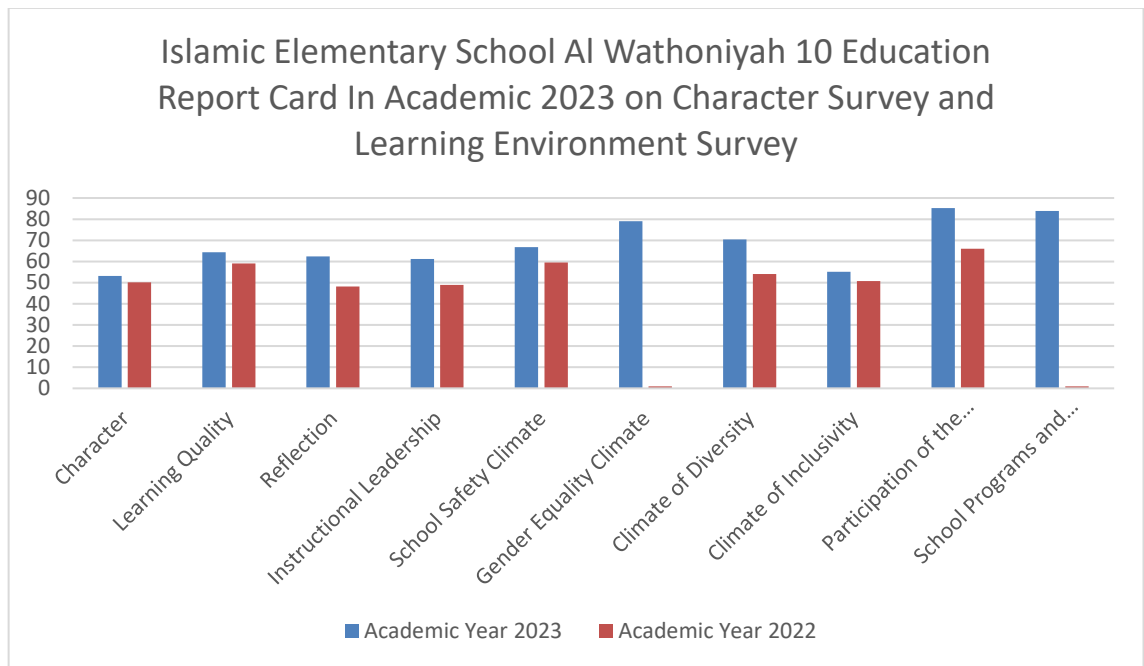

Figure 6.

Islamic Elementary School Al Wathoniyah 10 Education Report Card In Academic Year 2023 in the Character Survey and Learning Environment Survey

In Figure 6, there is an increase in both the character survey and the learning environment survey. The improvement in indicators varies from 5% to 80%. The increase in character indicators is 5.98%, learning quality is up by 9.07%, learning reflection by 29.76%, instructional leadership by 25.31%, school safety climate by 12.26%, gender equality climate by 78.05%, diversity climate by 30.18%, inclusivity climate by 8.69%, school community participation by 29.03%, and school policy program by 82.88%.

Based on the education report released by the Ministry of Education, Culture, Research, and Technology, it can be concluded that the computer-based national assessment at Islamic Elementary School Al Wathoniyah 10, particularly in the cognitive domain, can optimize the quality of students' learning at the school. Teacher FT revealed that the students of Islamic Elementary School Al Wathoniyah 10 obtained satisfactory results in the computer-based national assessment, primarily due to their familiarity and practice in solving literacy-based questions through computer-based testing(Guru FT, 2024).

The (Guru FT, 2024), in an interview, mentioned that there are differences between students when carrying out assessments using computer-based tests (CBT) and using paper-based methods. Students are more enthusiastic, happy, and less stressed when using CBT. They become more eager to work on evaluations and feel comfortable when conducting assessments using CBT. The anxiety associated with

traditional paper-based evaluations is eliminated, creating a more positive experience for students. A teacher commented, "Every time there is an evaluation activity that previously used paper-based methods, it makes students nervous. The exam atmosphere makes students work full of anxiety."(Guru FT, 2024). Using CBT will also make it easier for teachers to collect assessments because the grades will automatically appear after students have finished working. In addition, students are more engaged because they don't have to write out their answers anymore; they can simply click on the pre-existing answers available on the CBT screen.

The (Guru FT, 2024) stated that students are always happy and enthusiastic when the teacher announces a learning evaluation because they will have the opportunity to use gadgets or computers on the assessment day. The fear of evaluation using CBT has also disappeared, and students are no longer afraid when they hear about a learning evaluation. Additionally, the evaluation questions at Islamic Elementary School Al Wathoniyah 10 are designed in an interesting and inspiring language, creating new experiences for students. The competency indicators to be achieved focus on understanding, reflection, and evaluation rather than just memorization and recall. These indicators can be applied by students in their real, everyday lives.

The FT teacher emphasizes that in today's world, students can access information on the Internet at any time. Therefore, the questions given by teachers focus on implementation, what students can apply, and the benefits of learning. It is no longer relevant for students to simply memorize information or rely on rote learning. In implementing teaching and learning activities, all parents and guardians of students at Islamic Elementary School Al Wathoniyah 10 support the school's programs, including the requirement for students to bring information and communication technology devices such as smartphones or laptops, especially for learning evaluations. However, there are still students who may face challenges in bringing these devices and accessing stable internet connections when the whole class requires it. To address these challenges, the school provides facilities such as tablets, smartphones, laptops, and a computer laboratory. In dealing with network stability issues, the school installs routers in each classroom to ensure a stable internet connection.

DISCUSSION

1. Application of Information and Communication Technology (ICT) at Islamic Elementary School Al Wathoniyah 10 East Jakarta

The teaching and learning activities at Islamic Elementary School Al Wathoniyah 10 often involve the use of information and communication technology. Both teachers and students are accustomed to using various ICT equipment, such as tablets, computers, and laptops. Teachers at Islamic Elementary School Al

Wathoniyah 10 are required to develop ICT-based learning and evaluation media in their teaching implementation. Students prefer learning activities that involve the use of ICT. They are especially interested in accessing school e-learning and seeking learning resources on the Internet using the school's available facilities.

In line with the research conducted by(Warsihna, 2013), it is shown that the utilization of ICT can encourage teachers to enhance the quality of teaching, motivate students to enthusiastically participate in learning activities, and foster community involvement to courageously send their children to higher educational levels. Similarly (Nursyam, 2019) concluded in their research that the utilization of learning media using information technology can cultivate the learning interest of 10th-grade science students. Rahmad Hidayat stated that the use of technology for evaluation greatly facilitates teachers and students in working on and assessing evaluation questions(Hidayat, 2023).

From the explanation above, it can be concluded that the introduction and implementation of information and communication technology to the first-grade students at Islamic Elementary School Al Wathoniyah 10 is beneficial in order to prevent students from becoming technologically disadvantaged. It helps them become accustomed to operating information and communication technology equipment and can foster enthusiasm, interest, and motivation for learning.

2. Literacy-Based Cognitive Assessment Procedures Using Computer-Based Testing (CBT)

Islamic Elementary School Al Wathoniyah 10 uses a CBT application to conduct cognitive assessments of students. The process includes planning, development of questions, readability testing or validation, implementation, and evaluation, all of which are carried out effectively by the teachers. Teachers at Islamic Elementary School Al Wathoniyah, 10 in East Jakarta, prefer using CBT for cognitive assessments because it offers several benefits, such as time efficiency during assessments. Teachers no longer need to worry about assessment matters, as the grades appear automatically after students complete the test, and item analysis results are displayed, allowing teachers to determine the validity of the questions. Additionally, using CBT also helps save on paper expenses.

In addition, using CBT reduces the need to buy paper, aligning with the findings of (Habsari Ekohariadi, 2019) that CBT applications offer more interactive test questions and lower paper costs. Furthermore, CBT provides more transparent learning evaluations, as the correctness of answers is readily visible. According to FT teachers, students enjoy CBT-based cognitive assessments because they find it more engaging, akin to playing with a gadget, which keeps them mentally alert (Guru FT, 2024). Sri Mulianah, in her research, stated that test development can be done using a computer (basic computer test). Using computers as a substitute for tests that use paper and pencil is more efficient and effective (Mulianah & Hidayat, 2016).

Martin also concluded that the CBT developed was suitable for use as an assessment tool in physics learning in class X high school, especially for questions in the form of HOTS descriptions (Martin et al., 2018).

There are differences in the assessment procedures used by the researcher using CBT when compared to previous research conducted (Novrianti, 2014). Previous research mentioned that there are procedures for using CBT, including preparing assessment equipment such as personal computers (PC), preparing test questions in the form of a compact disk (CD), viewing simulations, conducting assessments, and giving one minute to answer each question.

The systematic steps in conducting literacy-based cognitive assessment using CBT can provide benefits such as identifying students' strengths and weaknesses. Teachers can understand which areas students excel in and where they need improvement. Accurate learning information allows teachers to design more focused and targeted interventions or treatments. Through quickly obtained scores, teachers can regularly monitor students' learning progress. Assessment results can be used to tailor teaching strategies to students' needs.

3. Computer Based Testing (CBT) to Optimize the Quality of Learning Evaluation

The students at Islamic Elementary School Al Wathoniyah 10 are accustomed to conducting assessments using Computer-Based Testing (CBT). The questions available in the CBT at Islamic Elementary School Al Wathoniyah 10 support students in thinking critically because the questions available are not just about memorizing knowledge but more about understanding and measuring the students' competencies. The questions available are equipped with long and complex reading stimuli that have meaning. Not only that, the stimuli also include pictures, infographics, and comics. The questions prepared by teachers have been adjusted to questions similar to the characteristics of national assessments. Therefore, students at Islamic Elementary School Al Wathoniyah 10 do not feel difficult and are not surprised when working on national assessment questions. This is evidenced by an improvement in educational reports, especially in literacy and numeracy skills scores.

Previous research has stated that the use of CBT AIO Moodle can optimize the implementation of end-of-semester assessments(Maulana, 2022). Student assessment in the digital era is now transitioning from paper-based assessments to assessments using computer assistance (Nagy & Korom, 2023). Previous researchers have discussed many advantages of computer-based exams over paper-based exams, such as lower script procurement and distribution costs (Alfarras et al., 2022), increased script security (Hartati & Mardiana, 2018), and ease of assessment (Supriyatna et al., 2020). Computer Based Test (CBT) is a series of computer-based tests or assessments that utilize the internet network and include

tests in the form of multiple choice and essays. The CBT system can effectively support assessment and exam administration(Syaifuddin et al., 2022). CBT is a computer-based assessment system designed to assist teachers in evaluating assessments, conducting tests, and ensuring the effectiveness of learning planning (N. A. Febrianti, 2022). Computer-based tests (CBT) are test systems that use computer technology to provide questions and answers. These tests can be carried out directly or using descriptive multiple-choice questions in an application. CAT-based learning evaluation aims to assess student learning outcomes and provide favorable conditions for teachers to carry out assessments(Slamet Utomo, 2022). Usually, teachers spend a significant amount of time calculating students' test scores (Tananda et al., 2023).

Based on the discussion that has been presented, it can be concluded that cognitive assessment based on literacy using computer-based tests (CBT) can optimize learning evaluation due to several benefits. First, accuracy and consistency in assessment. Scores or grades will be generated automatically. Students will also receive the same test questions and format with consistent assessment standards. Second, time efficiency. Test results can be obtained quickly, as the scores will be generated automatically after students complete the assessment process by the system. Third, the use of multimedia. The questions available in the CBT application vary, which prevents students from feeling bored. The questions are not just in written form but can also include infographics, images, and comics. Fourth, better analysis. The CBT system is capable of producing detailed reports and automatically analyzing test results. Data or grades are stored in the application regularly and can be easily retrieved when needed.

CONCLUSION

Based on the results and discussion, it can be concluded that the literacy-based cognitive assessment procedure using a Computer-based Test (CBT), which was carried out in a coherent and structured manner, was successfully used to optimize the quality of learning evaluation for Islamic Elementary School students. The use of CBT helps teachers in training students to utilize information and communication technology. Students are more enthusiastic and enjoy participating in assessments. They take assessment questions related to high-level thinking seriously. Through cognitive assessment questions in CBT, students are trained to handle high-level questions such as those commonly found in computer-based national assessments (ANBK) and Indonesian Islamic school competency assessment questions (AKMI). As a result, educational reports in 2023 show an improvement in literacy and numeracy skills, earning a top ranking nationally. This research recommends that schools use CBT applications to enhance the quality of learning evaluations.

This research has a few limitations that should be acknowledged and considered in interpreting the results and findings, including small sample size, research instruments, and time constraints. The researcher hopes that this research can serve as a point of reference for future researchers to conduct studies with a larger population and sample and to develop instruments in the form of surveys, questionnaires, test sheets, and observation sheets for each student to identify specific findings.

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