Submitted: 29/05/2025 Reviewed: 02/06/2025 Accepted: 05/06/2025 Published: 10/06/2025

Vol 4, No 3, (May - June 2025) Pages: 138-147

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E-ISSN 2963-0622

The Impact of Technology-Based Assessment on Enhancing Learning Quality in Junior High Schools in Cimahi City

Abstract

Technology-based assessment has emerged as a strategic innovation to enhance the quality of learning in junior high schools. This study aims to investigate the impact of technology-integrated assessments on students' academic performance and learning motivation at SMP Negeri 4 Cimahi. Employing a quantitative approach with a quasi-experimental design, the study involved 80 eighth-grade students divided into an experimental group (technology-based assessment) and a control group (traditional assessment). Data were collected through standardized achievement tests and validated motivation questionnaires and analyzed using t-tests. The findings reveal that technology-based assessments significantly improve students' academic achievement and motivation, driven by instant feedback and interactive formats. Nonetheless, challenges such as infrastructure limitations and digital literacy gaps remain prevalent. The study concludes that technology-based assessment effectively supports more relevant and higher-quality learning in the digital age. It recommends teacher training and infrastructure investment to ensure sustainable implementation.

Keywords: Assessment Impact, Technology-Based, Learning Quality, Junior High School

1. Introduction

Educational assessment plays a critical role in the learning process, serving not only to evaluate students' academic outcomes but also to support ongoing development. At the junior high school level, assessment goes beyond assigning final grades—it acts as a diagnostic tool that enables teachers to monitor student progress, design more effective instructional strategies, and provide meaningful feedback (Retnawati et al., 2016). When applied properly, assessment can transform learning into a more purposeful and engaging process, motivating students to reach their full potential. An effective assessment reflects not just cognitive outcomes but also holistic student development across affective and psychomotor domains.

In practice, educational assessments are typically categorized into formative, summative, and authentic assessments, each with distinct goals and characteristics (Kemendikbud, 2016). Formative assessment occurs during the learning process and provides real-time feedback for both students and teachers, enabling immediate instructional adjustments (Alline et al., 2024). In contrast, summative assessments are administered at the end of a learning period—such as final exams to measure overall learning achievements. These are generally more formal and result in standardized grades (Kemendikbud, 2016). Authentic assessment emphasizes the application of knowledge and skills in real-life contexts, such as through projects,

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presentations, or problem-solving tasks (Hilmi et al., 2018), aligning well with the skills needed for the workforce and social life, including critical thinking, collaboration, and creativity.

Assessment at the junior high school level is particularly strategic, as students at this stage are undergoing significant cognitive and socio-emotional development. According to Piaget's theory of cognitive development (Hilmi et al., 2018), students aged 12–15 are entering the formal operational stage, characterized by abstract thinking, hypothesis generation, and logical problem-solving. From a psychosocial perspective, Erikson's theory (Mufidah & Zunaidah, 2021) indicates that adolescents are navigating identity formation, peer pressure, and emotional fluctuations. Therefore, assessments must be designed with these developmental traits in mind to ensure valid, meaningful outcomes that foster holistic growth (Taher et al., 2023). Overly result-oriented or competitive assessments can induce stress, while inclusive and process-focused approaches promote enthusiasm and self-confidence in learning (Andini, 2022).

The rise of information technology has significantly transformed educational practices, including assessment. Technology-based assessment, involving the use of digital applications, software, and online platforms, offers several advantages over traditional paper-based methods (Hasyim, n.d.). It enables more efficient, accurate, and streamlined assessment processes, reducing the administrative burden on teachers. Furthermore, technology introduces interactive assessment formats—such as digital quizzes, simulations, gamified learning, and multimedia projects that can boost student engagement (Tahir & Wang, 2024). This aligns well with the digital-native generation, making assessment more relevant and appealing. Platforms like Google Classroom, Kahoot, and Quizizz offer instant feedback, which can enhance student motivation and confidence (Islam, 2024).

Previous research has consistently highlighted the benefits of technology-enhanced assessments. For example, Komalasari (2020) found that rapid, specific feedback provided by digital systems improves learning outcomes by helping students quickly identify and correct errors. Technology also supports differentiated instruction, allowing teachers to tailor tasks according to individual student abilities. This is especially important in heterogeneous junior high classrooms, where academic backgrounds and learning styles vary widely. Digital platforms also provide learning analytics that can help teachers identify learning patterns and design targeted interventions (Praseno, 2025). Thus, technology-based assessments not only increase efficiency but also promote personalized and effective learning.

However, the implementation of technology-based assessments faces several challenges. Infrastructure limitations—such as inadequate computer access, unstable internet connections, and inconsistent power supply—pose major obstacles, particularly in rural or under-resourced schools. Additionally, low digital literacy among teachers and students can hinder adoption. Many teachers, especially those accustomed to traditional methods, may resist change or lack adequate training. On the student side, the digital divide can result in unequal learning opportunities, especially for those from underprivileged families who lack access to devices or internet. Therefore, successful implementation requires a comprehensive strategy involving infrastructure investment, continuous teacher training, and strong administrative support to foster an inclusive digital learning environment (Nashrullah et al., 2025).

This study is unique in its specific focus on junior high school settings and its experimental design to examine the effect of technology-based assessments on both academic achievement and student motivation. It also identifies practical implementation barriers and proposes actionable strategies to overcome them, offering practical insights for educators and policymakers. By adopting this approach, the research provides empirical evidence to support the development of adaptive and sustainable assessment models in the digital era.

The urgency of this research is underscored by global calls for educational transformation in line with technological advancement. The fourth industrial revolution and the concept of



Society 5.0 emphasize digital skills, collaboration, and innovation as essential learning outcomes. Technology-based assessment is no longer a luxury but a necessity to prepare future generations for the challenges of the 21st century, including automation, artificial intelligence, and globalization. Theoretically, such assessments enhance the validity and reliability of evaluation by minimizing subjectivity and human error. As Sitorus & Murti (2024) argue, technology also allows for advanced data analytics—such as identifying error patterns or class achievement trends which supports more informed instructional decisions.

This study seeks to test the hypothesis that the implementation of technology-based assessment significantly enhances learning quality in junior high schools, measured through academic achievement and motivation. It also aims to identify key challenges and recommend effective strategies for implementation. The findings are expected to provide a solid empirical foundation for teachers, school leaders, and policymakers to develop innovative and sustainable assessment systems. Ultimately, this research aspires to act as a catalyst for educational transformation in junior high schools, fostering modern, inclusive, and motivating learning environments aligned with national educational goals.

2. Research Methodology

This study employed a **quantitative approach with a quasi-experimental design** to examine the impact of technology-based assessment on improving learning quality at the junior high school level, specifically at SMP Negeri 4 Cimahi. This approach was selected as it allows the researcher to observe the effects of a technology-based assessment intervention in a real educational context while controlling for relevant variables. A quasi-experimental design is particularly suitable for school environments where full randomization is often constrained by ethical and logistical considerations.

2.1. Time and Setting

The research was conducted over a three-month period, from January to March 2025, at SMP Negeri 4 Cimahi in West Java. This school was chosen due to its adequate technological infrastructure, including computer laboratories and stable internet access. The site selection was based on the availability of digital tools, teacher readiness for technology integration, and the school's commitment to educational innovation. Cimahi was considered a relevant research location due to its status as one of Indonesia's educational hubs with the potential to serve as a model for technological integration in education.

2.2. Research Subjects and Targets

The primary focus of the study was improving the quality of education, assessed through two key indicators: student academic achievement and learning motivation. The participants were 80 eighth-grade students, randomly divided into two groups: an experimental group (40 students) exposed to technology-based assessments, and a control group (40 students) using traditional paper-based assessments. Eighth-grade students were selected due to their cognitive developmental stage, which supports the effective use of educational technology, though still requiring guided facilitation. Pre-test analysis was conducted to ensure both groups had comparable demographics and baseline abilities.



2.3. Research Procedure

The research procedure was structured in three main phases: **preparation**, **implementation**, and evaluation.

- a. During the preparation phase, both teachers and students were briefed on the research objectives and the mechanism of technology-based assessment (Finy Fitriani, 2021). Teachers received a two-day training workshop on using digital assessment platforms such as Google Forms and Quizizz (Sari & Wardani, 2024). Experimental group students were also oriented to the platforms to ensure technical readiness. This phase concluded with a **pre-test** to measure students' initial academic performance (e.g., in Mathematics or Science, based on the curriculum).
- b. In the implementation phase, the experimental group underwent technology-based assessments during learning sessions, which included digital quizzes, multimedia tasks, and interactive simulations with instant feedback. These interactive tools were shown to enhance student motivation and achievement (Sari & Wardani, 2024). In contrast, the control group used conventional paper-based tests and assignments, evaluated manually in accordance with traditional assessment principles (Winarti et al., 2023). The intervention lasted for eight weeks with assessments conducted twice weekly to maintain consistency and track progress.
- c. In the evaluation phase, a **post-test** was administered to both groups, along with a **motivation questionnaire**. Additionally, brief interviews with teachers were conducted to gain insights into their experiences and challenges during implementation. This approach aligns with current models of technology-supported educational assessment (Marzuki et al., 2024).

2.4. Research Instruments

Three primary instruments were used in this study:

- a. **Student Achievement Test**: Consisted of 20 multiple-choice questions and 5 short essays, aligned with the 2013 Indonesian National Curriculum's core competencies. The tests were administered digitally (for the experimental group) and on paper (for the control group), with equivalent difficulty and content validated by experts.
- b. **Motivation Questionnaire**: Comprised 20 Likert-scale items (1–5), designed to measure both **intrinsic motivation** (e.g., learning interest) and **extrinsic motivation** (e.g., reward-driven effort). The questionnaire demonstrated strong construct validity and reliability (Cronbach's Alpha > 0.7).
- c. **Interview Guide**: A semi-structured guide used for brief interviews with teachers, focusing on student responses to technology-based assessment, implementation challenges, and recommendations for improvement.

2.5. Data Collection Techniques

Quantitative data were collected via digital and paper-based administration of achievement tests. The motivation questionnaire was distributed online to both groups to facilitate data processing. Qualitative data were obtained through face-to-face interviews with three teachers, each lasting 20–30 minutes. All data were anonymized and stored securely, used solely for research purposes.



2.6. Data Analysis Techniques

Quantitative data were analyzed using **descriptive statistics** (mean and standard deviation) and **inferential statistics** to test the research hypotheses. Normality was checked using the **Kolmogorov-Smirnov test**, followed by an **independent t-test** to compare outcomes between the experimental and control groups. A **paired t-test** assessed within-group progress in the experimental group before and after intervention. Additionally, **Pearson correlation analysis** was conducted to explore relationships between technology-based assessment and learning quality improvement.

Qualitative data from teacher interviews were analyzed using **thematic analysis**, identifying key themes such as perceived benefits, technical barriers, and suggestions for optimization. Triangulation of quantitative and qualitative data enhanced the validity of the findings. This comprehensive method offers robust insights into the effectiveness of technology-based assessments and identifies practical factors that support or hinder implementation in junior high schools.

3. Results and Discussion

This study aimed to assess the impact of technology-based assessment on improving learning quality at SMP Negeri 4 Cimahi, focusing on student achievement and motivation. The experimental group (40 students) utilized digital platforms like Google Forms and Quizizz, while the control group (40 students) used traditional paper-based assessments. Quantitative data were supported by qualitative insights from teacher interviews to understand the supporting and inhibiting factors of implementation.

3.1. Student Achievement and Motivation Outcomes

Statistical analysis revealed a **significant difference in academic performance** between the experimental and control groups. Post-test results showed that the experimental group achieved an average score of **82.4** (SD = 5.6), compared to **74.1** (SD = 6.3) in the control group. The independent t-test yielded a **p-value of 0.001** (< **0.05**), indicating that the difference is statistically significant.

Table 1: Comparison of Post-Test Scores

Group	Average Score	Standard Deviation	p-value
Experimental	82.4	5.6	0.001
Control	74.1	6.3	

This outcome demonstrates that technology-based assessment has a measurable and positive impact on academic achievement. Similarly, **motivation levels** were higher in the experimental group, with an average Likert score of **4.1**, compared to **3.5** in the control group. The t-test indicated a significant difference with a **p-value of 0.012** (< **0.05**).

Table 2: Comparison of Learning Motivation

Group	Motivation Score	Standard Deviation	p-value
Experimental	4.1	0.4	0.012
Control	3.5	0.5	



Increased motivation was attributed to the **instant feedback and interactive features** of digital platforms, which allowed students to promptly understand their strengths and weaknesses. This aligns with findings by Didik (2024), who emphasized that digital learning tools enhance engagement and learning enthusiasm. Such features foster a sense of progress and control, key elements in building sustained motivation.

3.2. Discussion: Academic Performance

The superior performance of the experimental group can be explained by several factors:

- a. **Variety and Interactivity**: Technology-enabled assessments incorporated engaging formats like gamified quizzes and simulations that increased student interest.
- b. **Objectivity and Accuracy**: Automated scoring minimized subjectivity and human error, improving result reliability.
- c. **Real-Time Feedback**: Immediate corrective feedback accelerated learning by enabling students to adjust their understanding promptly.

These findings are consistent with studies by **Suyuti et al.** (2023), who concluded that digital evaluation tools enhance both the efficiency and accuracy of competency assessments. Additionally, **Pedukun** (2025) found that digital assessment applications not only promote active student participation but also significantly boost learning outcomes.

Overall, this study reinforces the argument that technology-based assessment can serve as a powerful catalyst in fostering effective and responsive learning processes—particularly relevant for junior high students, whose cognitive and emotional development requires adaptive and engaging educational experiences.

Certainly! Here's the revised and paraphrased version of your discussion on learning motivation in English:

3.3. Discussion on Learning Motivation

The enhancement of learning motivation in the experimental group is closely linked to the characteristics of technology-based assessment. Real-time personalized feedback provided through digital platforms helps students feel valued and supported. This aligns with the principles of Self-Determination Theory (Deci & Ryan), which emphasizes the importance of fulfilling basic psychological needs such as competence and autonomy to boost intrinsic motivation. Research by Hakiki et al. (2022) indicates that prompt and specific digital feedback can increase students' confidence and sense of responsibility in learning, ultimately leading to improved motivation and learning outcomes.

Moreover, gamification elements in assessment applications, such as points, rankings, and interactive animations, make the assessment process more engaging and enjoyable. This is particularly crucial for junior high school students, who often experience a decline in motivation due to increasingly complex subject matter or monotonous teaching methods. By creating a more dynamic learning experience, technology-based assessments not only serve as evaluation tools but also as motivational learning media.

3.4. Supporting Factors and Implementation Barriers

Qualitative data from interviews with three teachers involved in the study reveal several factors supporting the success of technology-based assessments. First, intensive training provided to teachers before the study enabled them to confidently master digital platforms.



Teachers reported that the ease of use of applications like Quizizz and Google Forms enhanced efficiency in designing and evaluating assessments. Second, the technological infrastructure at SMP Negeri 4 Kota Cimahi, such as computer laboratories and stable internet networks, played a crucial role in the smooth implementation of these assessments.

However, some barriers were also identified. Teachers noted that not all students had access to digital devices at home, limiting the implementation of online assessments outside the classroom. Additionally, some students initially faced technical difficulties, such as navigating applications or experiencing slow internet connections, though these issues decreased over time with additional guidance. Resistance to change was also observed among senior teachers who felt more comfortable with conventional assessment methods (Angel et al., 2025). This indicates that digital transformation requires a gradual approach, supported by continuous socialization and training.

Table 3: Supporting Factors and	Implementation Barriers of	Technology-Based Assessments
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Category	Supporting Factors	Barriers
llleachers	_	Resistance to change, lack of technological experience
Students		Limited device access, initial technical difficulties
Infrastructure	· ·	Slow connections outside school, access inequality

3.5. Implications and Significance of the Study

This study provides significant empirical contributions to the development of assessment systems in junior high schools. The findings indicate that technology-based assessments not only improve learning outcomes but also strengthen student motivation, which is a crucial foundation for lifelong learning. This is in line with the findings of Salomo Leuwol et al. (2023), which show that the use of technology-based learning methods can enhance student motivation through the use of multimedia, learning applications, and e-learning. Therefore, schools need to integrate technology into assessments as part of educational modernization strategies, in line with the demands of the 4.0 industrial revolution and Society 5.0 era.

The practical implications of this study include the need for continuous teacher training to improve digital literacy and investment in technological infrastructure, such as providing reliable devices and internet networks (Alfirdausy & Luthfy, 2020). Educational policies at the local and national levels should also support this transformation through budget allocation and curriculum development that accommodates technology (Sitepu, 2021). Theoretically, this study reinforces the argument that technology can enhance the validity and reliability of assessments while supporting student-centered learning approaches (Pokhrel, 2024).

This research also opens opportunities for further studies, such as examining the long-term impact of technology-based assessments on 21st-century skills, such as critical thinking and collaboration (Lailan, 2024). Additionally, ongoing qualitative research can be conducted to understand students' and teachers' perceptions of technology. Such studies can also explore psychological factors influencing technology adoption in schools with limited resources (Rahmania & Hudri, 2024).



4. Conclusion and Suggestion

4.1. Conclusion

This study aims to examine the impact of technology-based assessments on improving the quality of learning in junior high schools, focusing on learning outcomes and student motivation. Based on data analysis from 80 eighth-grade students at SMP Negeri 4 Kota Cimahi, it was found that technology-based assessments have a significant positive impact on both aspects. The experimental group, which used digital platforms like Google Forms and Quizizz, showed an average learning outcome score of 82.4, much higher than the control group (74.1), with a statistically significant difference (p-value = 0.001). Similarly, the motivation score of the experimental group reached an average of 4.1 (on a scale of 1–5), higher than the control group (3.5), with a p-value of 0.012. These findings confirm the hypothesis that technology-based assessments can improve the quality of learning in junior high schools, in line with Deci and Ryan's (1985) intrinsic motivation theory, which emphasizes the importance of relevant and prompt feedback.

The success of technology-based assessments can be attributed to features such as instant feedback, interactive gamified formats, and accurate data processing, which not only enhance academic results but also student engagement. Qualitative data from teacher interviews reinforce these findings, highlighting the role of teacher training and technological infrastructure as key supporting factors. However, challenges such as limited device access, initial technical difficulties among students, and resistance to change among teachers indicate that technology implementation requires a strategic and inclusive approach.

Overall, this study emphasizes that technology-based assessments are not only evaluation tools but also learning media capable of creating a more dynamic, responsive, and motivating learning environment. In the junior high school context, where students are forming academic foundations and attitudes toward learning, this approach has great potential to support holistic development while addressing the demands of educational transformation in the digital era.

4.2. Suggestion

Based on the study's findings, several recommendations are proposed to maximize the benefits of technology-based assessments in junior high schools

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