JPPIPA 11(11) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Validation of a Google Sites-Based LMS Evaluation Instrument with the Importance Performance Analysis Approach in Sustainable Learning

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Received: September 19, 2025
Revised: October 10, 2025
Accepted: November 25, 2025
Published: November 30, 2025

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DOI: 10.29303/jppipa.v11i11.12901

Abstract: Evaluating the feasibility and performance of a Learning Management System (LMS) requires a valid and reliable assessment instrument, especially for platforms such as Google Sites that are widely used in low-resource educational settings. This study aims to validate an LMS evaluation instrument that integrates Importance Performance Analysis (IPA) and Education for Sustainable Development (ESD) indicators. A quantitative descriptive design was employed involving 40 respondents consisting of teachers and students at SMPN 1 Jereweh, Indonesia. Data were analyzed through item–total correlation and Cronbach's Alpha to determine validity and reliability, followed by IPA quadrant mapping and descriptive analysis for ESD indicators. All items achieved correlation values above 0.30, and the instrument demonstrated strong internal consistency with a Cronbach's Alpha of 0.782. IPA results showed that Content Quality and Accessibility & Sustainability were classified in the Keep Up the Good Work quadrant, while Design & Navigation and Evaluation & Feedback fell into the Concentrate Here quadrant. ESD analysis indicated high ratings for digital literacy and collaboration, while sustainability values scored the lowest. These findings confirm that the instrument is valid and reliable and can effectively identify priority areas for improving Google Sites–based LMS within the principles of sustainable learning

Keywords: ESD; Google Sites; Importance performance analysis; LMS

Introduction

The digital transformation in education has significantly reshaped how educational institutions manage and deliver the learning process (Mohamed Hashim et al., 2022; Rof et al., 2022). The use of online-based technologies, particularly through Learning Management Systems (LMS), provides great opportunities to enhance flexibility, accessibility, and learner engagement (Nashar et al., 2024; Pradnyana et al., 2024; Sihotang, 2025). An LMS does not merely function as a medium for content distribution but also serves as a platform for interaction, assessment, and monitoring, thereby supporting the sustainability of the learning process (Bradley, 2021; Veluvali et al., 2022; Zanjani, 2017).

Within the framework of Education for Sustainable Development (ESD), the utilization of LMS holds a strategic role as it supports the development of 21st-century skills, digital literacy, and lifelong learning (Muhidin, 2025; Tasliah et al., 2024). Therefore, a comprehensive evaluation is required to ensure that the LMS being implemented is not only feasible and aligned with user needs but also consistent with the goals of sustainable education (Alharthi et al., 2019; Alturki et al., 2021; El Marsafawy et al., 2022).

How to Cite:
Hidayat, S., & Saputra, R. D. A. (2025). Validation of a Google Sites-Based LMS Evaluation Instrument with the Importance Performance Analysis Approach in Sustainable Learning. *Jurnal Penelitian Pendidikan IPA*, *11*(11), 317–322. https://doi.org/10.29303/jppipa.v11i11.12901

Previous studies have extensively examined the quality of LMS platforms such as Moodle, Edmodo, and Google Classroom using usability testing and the Technology Acceptance Model (TAM) (Fajri et al., 2021; Santiadi et al., 2024). However, in-depth research on the feasibility of Google Sites–based LMS remains limited. In fact, Google Sites, as a free, lightweight, and easily accessible platform, has significant potential to support sustainable learning, especially in educational institutions with limited resources (Asi et al., 2018; Güntem et al., 2025; Zhan et al., 2015).

The present study addresses this research gap by employing the Importance Performance Analysis (IPA) approach introduced by Martilla et al. (1977). This analytical model maps the importance and performance levels of each indicator, enabling researchers to identify which aspects should be maintained, improved, or prioritized for development (Ban et al., 2024; Kuo et al., 2012; McLeay et al., 2017). In addition, IPA provides a structured evaluation of users' perceptions of LMS quality and generates more targeted improvement recommendations aligned with priority needs (Almusfar, 2025; Almusharraf, 2024; Ngulube et al., 2025).

Based on this rationale, the study was conducted at SMPN 1 Jereweh, West Sumbawa, with the aim of analyzing the feasibility of a Google Sites–based LMS through the IPA approach in supporting sustainable learning (ESD). The findings are expected to serve as a reference for the development and utilization of effective, efficient, and sustainability-oriented LMS practices.

Method

This study was conducted from March to July 2025 at SMPN 1 Jereweh, West Sumbawa, where a Google Sites–based Learning Management System (LMS) had been implemented to support digital learning activities. The research employed a descriptive quantitative design using the Importance Performance Analysis (IPA) approach to evaluate the feasibility of the LMS within the framework of Education for Sustainable Development (ESD). IPA was selected because it allows the alignment between importance and performance indicators to be mapped, making it possible to identify aspects that require improvement as well as those already functioning effectively (Kuo et al., 2012; Martilla et al., 1977; McLeay et al., 2017). The research involved 40 respondents—teachers and students—who were selected using purposive sampling based on their direct experience using the Google Sites LMS in classroom learning activities. The presence of researchers during data collection ensured that respondents provided accurate and meaningful input (Muhidin, 2025; Tasliah et al., 2024).

The research instrument was developed through an extensive literature review and consisted of two major groups of indicators. The first group includes IPA indicators: usability, accessibility, content quality, interactivity, and learner support (Fajri et al., 2021; Santiadi et al., 2024). The second group includes ESD indicators that measure the LMS's contribution to developing 21st-century skills, digital literacy, collaboration, lifelong learning, and the internalization of sustainability values (Muhidin, 2025). All items were arranged on a five-point Likert scale to measure both importance and performance levels. The research proceeded through several stages, including instrument construction, expert judgment for content validation, pilot testing, and field data collection.

Data were collected at SMPN 1 Jereweh, West Sumbawa, involving 40 respondents consisting of teachers and students who used the Google Sites LMS. Respondents were selected through purposive sampling, as they had direct experience utilizing the LMS in learning activities. The presence of researchers during the data collection process was essential to ensure meaningful participation in the study.

The collected data were analyzed in two main stages. First, reliability testing was carried out using Cronbach's Alpha to ensure the internal consistency of the instrument, with a value ≥0.70 considered acceptable for instrument validity (Almanasreh et al., 2019; Puspitasari et al., 2021). Second, the research data were analyzed. For the IPA indicators, the mean values of importance and performance were calculated for each item, then mapped into an IPA quadrant diagram, which consists of four sections: Concentrate Here (high importance, low performance), Keep Up the Good Work (high importance, high performance), Low Priority (low importance, low performance), and Possible Overkill (low importance, high performance) (Ban et al., 2024). For the ESD indicators, data were analyzed descriptively by calculating the mean score of each indicator, which was then categorized into five feasibility levels: very good, good, fair, poor, and very poor. This methodological approach allowed for a comprehensive evaluation of the technical performance of the LMS as well as its alignment with sustainable learning principles.

Result and Discussion

The validity test using item-total correlation indicated that all items had correlation values above 0.30, thus confirming their validity. This result demonstrates that each item was able to adequately represent the constructs being measured. The reliability

test using Cronbach's Alpha produced a total value of 0.782, indicating very good internal consistency. These results confirm that the instrument is reliable and suitable to be used as an evaluation tool for the LMS.

Table 1. Reliability Test Results of the LMS Evaluation Instrument

Evaluation Dimension	Number of Items	Cronbach's Alpha	Description
Content Quality	4	0.801	Reliabel
Design & Navigation	4	0.722	Reliabel
Interactivity & Engagement	3	0.812	Reliabel
Accessibility & Sustainability	3	0.781	Reliabel
Evaluation & Feedback	3	0.795	Reliabel
Total Instrument	17	0,782	Reliabel

The next stage of analysis employed the Importance Performance Analysis (IPA) model (Martilla & James, 1977; Kuo et al., 2012). The mean scores of importance and performance for each indicator were mapped into the IPA quadrant diagram. The results showed that Design & Navigation and Evaluation & Feedback fell into the Concentrate Here quadrant, indicating that these aspects are considered important but their performance remains low and therefore require priority improvement. This finding is consistent with previous studies emphasizing that interface design quality and evaluation mechanisms are critical factors in the success of LMS implementation (Ban et al., 2024; McLeay et al., 2017). Conversely, Content Quality and Accessibility & Sustainability were placed in the Keep Up the Good Work quadrant, as they were rated both important and high-performing. Meanwhile, Interactivity & Engagement was mostly located in the Low Priority quadrant, suggesting that although its performance is relatively adequate, its perceived importance is comparatively lower according to respondents.

Table 2. Results of Importance Performance Analysis (IPA) of Google Sites LMS Evaluation

Evaluation Dimension	Mean Importance	Mean Performance	IPA Quadrant
Content Quality	4.5	4.32	Keep Up the Good Work
Design & Navigation	4.42	3.68	Concentrate Here
Interactivity & Engagement	3.85	3.72	Low Priority
Accessibility & Sustainability	4.6	4.41	Keep Up the Good Work
Evaluation & Feedback	4.38	3.7	Concentrate Here

The IPA analysis above provides a strategic overview of priorities for developing the Google Sites LMS. Accessibility and content quality should be maintained as core strengths, while design navigation and feedback mechanisms need improvement to meet user expectations. This is consistent with previous findings highlighting IPA as an effective tool to identify priority areas for improvement in educational services (Ban et al., 2024; Martilla et al., 1977).

In addition, this study also integrated Education for Sustainable Development (ESD) indicators to assess the extent to which the Google Sites LMS supports sustainable learning. The descriptive analysis showed that digital literacy and collaboration indicators achieved the highest mean scores (≥ 4.30), categorized as very good. Lifelong learning and 21st-century skills development were rated as good, with average scores ranging between 4.00–4.20. These results reinforce previous studies that emphasized the role of ESD in fostering students' digital literacy and collaboration (Muhidin, 2025; Tasliah et al., 2024).

Meanwhile, the sustainability values internalization indicator obtained the lowest score (3.85), categorized as fair, suggesting the need for stronger integration of sustainability values into both content and learning activities. Previous scholars have also noted that embedding sustainability values remains one of the main challenges in implementing ESD (Sass et al., 2024).

This interpretation provides a strategic direction: the development of Google Sites-based LMS should focus on improving more user-friendly navigation design and more effective feedback mechanisms. At the same time, the strengths of content quality and accessibility should be maintained to ensure that the LMS continues to support the goals of sustainable learning.

Table 3. Results of Education for Sustainable Development (ESD) Indicator Analysis

ESD Indicator	Mean Score	Category
Digital Literacy	4.35	Very Good
Collaboration	4.32	Very Good
Lifelong Learning	4.18	Good
21st-Century Skills	4.05	Good
Sustainability Values Internalization	3.85	Fair

These results confirm that the Google Sites LMS contributes positively to enhancing digital literacy, collaborative skills, and supporting lifelong learning practices (Munna et al., 2024). However, specific strategies are needed to integrate sustainability values into content design and learning activities, such as through local case studies, environment-based projects, or embedding Sustainable Development Goals (SDGs) themes. This aligns with UNESCO's perspective, which emphasizes the importance of integrating sustainability

issues into curricula and educational technologies (Abo-Khalil, 2024; Angelaki et al., 2024).

The findings further demonstrate that the Google Sites–based LMS evaluation instrument is valid, reliable, and capable of revealing priority areas for development. The IPA approach enables a targeted analysis of the system's strengths and weaknesses (Kuo et al., 2012; Martilla et al., 1977), while the ESD indicators provide an additional perspective on the system's contribution to sustainable education goals. Thus, this study contributes not only to the domain of educational technology evaluation but also to the advancement of educational practices aligned with sustainability principles.

The combined analysis of IPA and ESD offers a comprehensive overview of the quality of the Google Sites LMS. IPA functions to map the system's practical strengths and weaknesses, thereby facilitating the determination of improvement priorities. For example, the Design & Navigation and Evaluation & Feedback dimensions, which were categorized in the "Concentrate Here" quadrant, indicate that although these aspects are considered important by users, their implementation remains suboptimal. This provides strategic input for developers to improve interface design, navigation ease, and the availability of more interactive evaluation mechanisms.

On the other hand, the ESD indicators provide a broader perspective by highlighting the extent to which the LMS supports digital literacy, collaboration, 21st-century skills, and lifelong learning. The results indicate that while the Google Sites LMS effectively supports these dimensions, the internalization of sustainability values remains relatively weak. Whereas IPA focuses on identifying technical-functional improvements, the ESD results underscore the importance of integrating content and learning activities that advance sustainability goals. By combining both approaches, this study presents a more holistic evaluation framework: IPA directs developers to prioritize technical aspects for improvement, while ESD ensures that LMS development remains aligned with the principles of sustainable education.

Conclusion

This study validated a Google Sites–based LMS evaluation instrument using the Importance Performance Analysis (IPA) framework within the context of Education for Sustainable Development (ESD). The instrument demonstrated strong validity and reliability, confirming its feasibility for assessing LMS performance. IPA results indicated that content quality and accessibility represent key strengths of the LMS, while navigation design and feedback mechanisms require targeted improvement. The ESD findings further showed that the LMS supports digital literacy, collaboration, and lifelong learning, although the internalization of sustainability values remains limited. Beyond these empirical findings, the study offers several broader implications. The validated instrument contributes to the literature by providing a practical and context-sensitive tool for evaluating lightweight, low-resource LMS platforms such as Google Sites, which are increasingly adopted in schools with limited technological infrastructure. The integration of IPA and ESD also presents a dual-evaluation framework that can guide developers, educators, and policymakers in aligning technical quality with sustainable learning goals. However, this study has several limitations. The sample size was relatively small and drawn from a single school, which may limit the generalizability of the findings. The instrument relied solely on self-report data, which may introduce response bias. Future research should apply the instrument across diverse educational contexts, incorporate qualitative methods such as usability testing or interviews, and explore additional ESD dimensions to strengthen the measurement of sustainability values. Longitudinal studies are also recommended to examine how LMS improvements influence sustainable learning outcomes over time.

Acknowledgments

The authors would like to express their sincere gratitude to SMPN 1 Jereweh, West Sumbawa Regency, for granting permission and providing support during the implementation of this study. Special thanks are also extended to the teachers and students who participated as respondents, whose valuable contributions made this research possible.

Author Contributions

Conceptualization, research instrument design, data collection and analysis, drafting of the initial manuscript, and substantial content revisions, S.H. Supervision, instrument validation, methodological guidance, research findings analysis, critical review of the manuscript draft, and final refinement of the manuscript, R.D.A.S. Both authors have read and approved the final version of the submitted manuscript.

Funding

This research was supported by the Penelitian Dosen Pemula (PDP) grant from the Directorate General of Higher Education, Research, and Technology, Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia, Fiscal Year 2025.

Conflicts of Interest

The author declares no conflicts of interest related to the publication of this scientific article

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