

Empirical Paper

Development and Evaluation of a Google Sites-Based E-Learning Platform for Enhancing Diversity Climate and Learning Quality in Junior High Schools

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Abstract

Purpose: This study aimed to develop and evaluate a Google Sites-based e-learning platform (E-learning APIK) to enhance diversity climate and learning quality among junior high school students.

Methodology: Using a Research and Development (R&D) approach based on the adapted Borg and Gall model, the study involved needs analysis, design, validation, revision, and implementation. Data were collected from 35 seventh-grade students and one teacher through questionnaires, observations, interviews, and pre-test-post-test measures, and analysed using descriptive statistics and N-gain analysis.

Results: The platform was found to be highly feasible, with strong expert validation scores (average = 3.75) and positive responses from students (3.81) and the teacher (3.60). Effectiveness testing showed a moderate improvement in diversity climate and learning quality (N-gain = 0.33).

Novelty and Contribution: This research contributes to the literature by providing an integrated model that combines product development, validation, and effectiveness testing, while extending the application of Google Sites to diversity education and demonstrating its potential to influence both learning outcomes and school climate.

Practical and Social Implications: The findings highlight the importance of pedagogically designed digital platforms in promoting inclusive learning, improving educational quality, and strengthening teachers' digital competencies.

Keywords: e-learning, diversity climate, Google Sites, inclusive education, learning quality

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1 Introduction

Character education is a crucial foundation for developing a generation that is not only intellectually superior but also possesses strong morals, ethics, and national values (Santoso, 2021). One strategic means of instilling these national character values is through strengthening the climate of diversity in the school environment (Fauzi & Barory, 2024). The diversity climate in schools plays a vital role in creating an inclusive, safe, and supportive environment for all students, regardless of their background differences. Schools capable of building a diversity climate will encourage the growth of tolerance, empathy, and appreciation for differences, ultimately improving student well-being and achievement (Istianah et al., 2024).

Despite its importance, the implementation of diversity and inclusive values in school settings remains challenging. In many cases, teaching practices are still dominated by conventional, teacher-centred approaches that limit student participation and meaningful engagement with diversity-related content (Cruz et al., 2025). This issue is evident in SMP Negeri 2 Gabus, where the 2024 education report card indicates a decline in both the diversity climate indicator (by 1.99 points) and learning quality (by 3.32 points) (Ministry of Primary and Secondary Education, 2026). This decline indicates an urgent need for innovation in the learning process and strengthening diversity and inclusivity values in the school environment (Mallillin et al., 2024). The learning process tends to be dominated by conventional methods, resulting in suboptimal student engagement in understanding and internalising diversity values (Byrd et al., 2020).

The rapid advancement of digital technology presents new opportunities to address these challenges. Today's students are digital natives who are accustomed to interactive, multimedia-rich environments. Integrating technology into the learning process, particularly through e-learning platforms, has been shown to improve student motivation, engagement, and learning effectiveness (Sujarno et al., 2025). E-learning enables flexible access to learning materials, supports diverse learning styles, and facilitates interactive and student-centred learning experiences (Panigrahi et al., 2021). In the context of diversity education, digital platforms can be designed to present inclusive content in engaging and meaningful ways, thereby supporting the development of students' social awareness and attitudes (Siddiqi, 2024).

Among digital tools, Google Sites provides a practical, accessible platform for developing web-based learning media. It allows educators to integrate multimedia elements such as text, videos, interactive quizzes, and collaborative activities into a single, user-friendly interface without requiring advanced technical skills (Sakinah et al., 2025). Previous studies have demonstrated the effectiveness of Google Sites in enhancing student motivation, learning independence, and critical thinking skills (Fitriyah & Turmudzi, 2025; Sujarno et al., 2025). However, most existing research has focused on its application in specific subject areas such as science, technology, or elementary education (Susiana & Priyatin, 2025). Limited attention has been given to its use in diversity education, particularly at the junior high school level, and its potential impact on both diversity climate and learning quality remains underexplored (Siddiqi, 2024). Furthermore, prior studies on Google Sites-based learning media have largely emphasised usability and learning outcomes, with less focus on integrating inclusive education principles or assessing broader educational impacts such as school climate (Kurniawati & Ramadan, 2025; Laili et al., 2025). There is also a lack of research that combines product development, expert validation, user responses, and effectiveness testing within a single comprehensive study (Kurniawati & Ramadan, 2025). This indicates a clear research gap in the development and evaluation of digital learning media that specifically addresses diversity education while simultaneously examining its impact on both cognitive and socio-cultural learning outcomes.

To address this gap, this study develops a Google Sites-based e-learning platform, referred to as E-learning APIK, designed to support diversity and inclusive education in junior high schools. The platform integrates multimedia content, interactive activities, and collaborative learning features tailored to students' characteristics and learning needs. This study not only focuses on the development of the platform but also evaluates its feasibility through expert validation and user responses, as well as its effectiveness in improving the diversity climate and learning quality. Accordingly, the objectives of this study are threefold: (1) to develop a Google Sites-based e-learning platform for diversity education, (2) to evaluate its feasibility based on expert validation and user responses, and (3) to assess its effectiveness in improving the diversity climate and learning quality among junior high school students. By doing so, this study contributes to the growing body of research on digital learning innovation and provides practical insights for educators seeking to integrate inclusive values into technology-enhanced learning environments.

2 Literature Review

2.1 E-learning and Learning Effectiveness

E-learning has evolved into a central component of contemporary education, driven by the increasing integration of information and communication technologies into teaching and learning processes (Ukpe, 2023). It enables the delivery of instructional content, interaction, and learning management through digital platforms that are accessible across time and space (Sujarno et al., 2025). As noted by Liu and Yu (2023), e-learning supports flexible, interactive, and structured knowledge delivery, allowing learners to engage with content beyond the constraints of traditional classrooms.

Beyond accessibility, the effectiveness of e-learning lies in its capacity to enhance student engagement and learning outcomes. Empirical evidence suggests that well-implemented e-learning systems can increase learning interest, strengthen students' motivation, and improve instructional effectiveness (Alsawaries & Khataybeh, 2021). These benefits are largely attributed to the interactive and student-centred nature of digital learning environments, which encourage active participation rather than passive content reception. In addition, e-learning platforms can be designed to accommodate diverse learning styles and learner needs, making them particularly relevant in contexts that require inclusive and adaptive pedagogical approaches (Matthew et al., 2018). However, the effectiveness of e-learning is not solely dependent on technology availability but also on how learning experiences are designed. Interactive content, multimedia integration, and opportunities for collaboration are critical in transforming e-learning from a content delivery tool into a meaningful learning environment (Singh et al., 2023). This is especially important in areas such as diversity education, where engagement, reflection, and contextual understanding are essential for developing students' attitudes and values (Fauzi & Barory, 2024).

2.2 Google Sites as a Digital Learning Platform

Among the various platforms available for e-learning development, Google Sites offers a practical and accessible solution for educators (Jusriati et al., 2021). It allows users to create web-based learning environments without requiring advanced programming skills, enabling the integration of multimedia elements such as text, videos, documents, and interactive quizzes within a single platform (Ouadoud et al., 2021). Hartari et al. (2025) highlight that Google Sites is effective as a learning medium due to its ability to present content in an organised, interactive, and visually appealing format.

In educational settings, Google Sites provides flexibility for teachers to design personalised and adaptive learning materials that can be updated and accessed easily (Ouadoud et al., 2021). Its integration with Google Workspace for Education further enhances its functionality by enabling seamless sharing, collaboration, and resource management. Studies have shown that the use of Google Sites in learning can improve student motivation, support independent learning, and enhance critical thinking skills (Munawirah & Sitompul, 2024). Despite these advantages, existing research on Google Sites has largely focused on its application in specific subject areas, particularly in science and technology-related disciplines or at the elementary school level (Susiana & Priyatin, 2025). There is limited research examining its use as a medium for delivering socio-cultural content such as diversity education. Furthermore, few studies have explored its broader impact beyond cognitive outcomes, such as its influence on students' attitudes, values, and the overall learning environment (Kurniawati & Ramadan, 2025; Laili et al., 2025). This indicates a need for more comprehensive investigations into how Google Sites can be utilised to support inclusive and value-based education.

2.3 Diversity Climate and Inclusive Education

The concept of diversity climate in education describes the collective perception of policies and practices within a school that encourage respect, inclusion, and appreciation of differences among students (Fauzi & Barory, 2024). A positive diversity climate is characterised by mutual respect, acceptance of diverse backgrounds, and the integration of inclusive values into the learning process (Dharmawan, 2024). Such an environment is essential for fostering students' social development and promoting harmonious interactions in multicultural settings (Istianah et al., 2024).

Research indicates that schools that actively promote diversity and inclusion tend to create safer and more supportive learning environments, which positively influence student well-being and engagement (Levine et al., 2024). Kyriakou et al. (2026) demonstrate that digital training programmes addressing diversity and social justice can enhance teachers' multicultural competence, suggesting that technology can play a significant role in promoting inclusive practices. Similarly, Mazid and Istianah (2023) emphasise the role of civic education in building peaceful school environments that reflect values of unity and social cohesion. Inclusive education extends this concept by ensuring that all students, regardless of their abilities, cultural backgrounds, or social identities, have equal access to quality education. Navas-Bonilla et al. (2025) highlight that technology plays a crucial role in supporting inclusive education by providing tools and systems that accommodate diverse learner needs. In the context of digital learning, inclusivity requires not only access to technology but also the design of learning experiences that are responsive to different learners.

Recent studies further emphasise that inclusive digital education must be adaptive and user-centred. Shattuck (2025) notes that distance education for diverse populations requires flexible and responsive approaches, while Lomellini et al. (2025) underline the importance of accessibility in online learning environments to ensure that all students can participate effectively. These perspectives suggest that digital platforms, when thoughtfully designed, can contribute significantly to building inclusive and diversity-supportive learning environments.

2.4 Learning Quality in Digital Environments

Learning quality encompasses not only academic achievement but also the effectiveness of the learning process, including student engagement, instructional strategies, and learning experiences. According to Sadikin and Hamidah (2021), high-quality learning is characterised by active student participation, meaningful interaction, and the use of appropriate instructional media that support understanding. The integration of e-learning into educational practice has been shown to enhance learning quality by providing flexible access to materials, enabling self-paced learning, and promoting interactive engagement (Ebbini, 2023). Alsawaries and Khataybeh (2021) found that blended e-learning approaches can significantly improve both cognitive and affective learning outcomes, highlighting the potential of digital learning environments to support holistic student development. In the Indonesian context, Utami (2023) demonstrates that Google Sites as a learning medium can encourage critical thinking, collaboration, and learner autonomy. These findings suggest that digital platforms can play a vital role in improving not only students' academic performance but also their engagement and responsibility in the learning process.

The reviewed literature indicates that e-learning platforms, particularly those that integrate interactive and multimedia elements, have significant potential to enhance student engagement and learning outcomes. Google Sites, as an accessible and flexible platform, has been shown to support effective learning across various contexts (Jusriati et al., 2021). At the same time, promoting a positive diversity climate and inclusive education remains a critical goal in contemporary schooling, requiring innovative approaches that go beyond traditional teaching methods.

3 Methodology

3.1 Research Design

This study employed a Research and Development (R&D) approach aimed at designing, developing, and evaluating a digital learning product in the form of a Google Sites-based E-learning platform (E-learning APIK). The study adopted an adapted Borg and Gall development model, integrating both product development and evaluation phases to assess feasibility and effectiveness (Aka, 2019). The approach was participatory and collaborative, involving key stakeholders within the school environment, including the principal, teachers, students, and subject-matter and media experts. In addition to product development, the study incorporated an effectiveness evaluation using a one-group pre-test–post-test design to examine changes in diversity climate and learning quality after implementation.

3.2 Development Procedure

The development process followed ten stages adapted from Borg and Gall, contextualised to the study setting as shown in Table 1.

Table 1 The development process following the Borg and Gall steps

Borg and Gall's 10 steps	Description
Needs analysis	Identification of instructional problems and user needs
Planning	Determination of learning objectives, content scope, and platform structure
Prototype development	Initial design of the E-learning APIK platform
Expert validation	Evaluation by media, material, and language experts
Limited trial	Initial testing with a small group of users
Revision and improvement	Refinement based on feedback
Wider implementation	Application in the classroom setting
Impact measurement	Assessment of learning outcomes and diversity climate
Data analysis and reporting	Statistical and descriptive analysis
Dissemination	Documentation and reporting of findings

This structured process ensured that the developed product underwent iterative improvement before final evaluation.

3.3 Participants and Research Context

The study was conducted at SMP Negeri 2 Gabus, involving 35 seventh-grade students as the primary participants and 1 subject teacher who facilitated the implementation. Participants were selected using purposive sampling, based on their involvement in diversity education learning activities. The relatively small and focused sample is consistent with R&D studies aimed at product validation and initial effectiveness testing.

3.4 Instruments and Data Collection

Data were collected using both test and non-test instruments to capture cognitive and affective learning outcomes.

- a) Questionnaire; used to measure diversity climate, learning quality, and user responses (students and teachers), structured using a 4-point Likert scale (1 = very poor to 4 = very good).
- b) Observation Sheets; used to assess students' attitudes, participation, and engagement during learning activities.
- c) Interview Guidelines; semi-structured interviews conducted with teachers and students to support needs analysis and product evaluation.
- d) Validation Instruments; used by experts to evaluate content quality, media design, and language clarity.

3.5 Validity and Reliability

Instrument validity was established through expert judgment, involving five validators: 1 media expert, 2 subject-matter experts, and 2 language experts. Each expert assessed the instrument and product using structured evaluation sheets. Content validity was ensured by aligning items with research objectives and indicators of diversity climate and learning quality. While reliability testing was limited to expert agreement due to the developmental nature of the study, consistency in evaluation was maintained through standardised rating scales and clear assessment criteria.

3.6 Data Analysis Techniques

Data analysis was conducted using both descriptive and quantitative approaches:

(a) Feasibility Analysis

Feasibility was determined using mean scores from expert validation and user responses, interpreted using the following criteria:

Table 2 Feasibility criteria

Average Score	Criteria	Description
$3.25 < x \leq 4.00$	Highly feasible	Usable without revision
$2.50 < x \leq 3.25$	Feasible	Usable with minor revisions
$1.75 < x \leq 2.50$	Less feasible	Requires major revisions
$1.00 < x \leq 1.75$	Not feasible	Not suitable for use

(b) Validation Analysis

Design validation was conducted after the Google Sites-based E-learning APIK platform was completed. The validation process involved five experts with different backgrounds: (1) media expert, (2) material expert 1, (3) material expert 2, (4) language expert 1, and (5) language expert 2. The validation questionnaire used a Likert scale with four levels: 1 = very poor, 2 = poor, 3 = good, and 4 = very good. Expert validation scores were converted into percentages and interpreted as:

Table 3 Design validation

Percentage	Category	Description
81–100%	Very good	Very valid / no revision required
61–80%	Good	Valid/minor revision
41–60%	Fair	Moderate validity/revision needed
21–40%	Poor	Low validity / major revision needed
0–20%	Very poor	Invalid / not usable

(c) Effectiveness Analysis

To measure learning improvement, the Normalised Gain (N-gain) was used:

$$\text{N-gain} = \frac{\text{Post-test} - \text{Pre-test}}{\text{Maximum score} - \text{Pre-test}}$$

The N-gain results were interpreted as: High ($g > 0.70$), moderate ($0.30 \leq g \leq 0.70$) or low ($g < 0.30$)

This analysis was used to evaluate improvements in diversity climate and learning quality following the implementation of the E-learning APIK platform.

3.7 Needs Analysis

The needs analysis was conducted through questionnaires, interviews, and document analysis. Findings indicated that: students showed low engagement in diversity-related learning, teaching methods were largely teacher-centred, digital media use was limited and non-interactive, and students expressed a strong preference for interactive and multimedia learning tools. These findings were supported by school performance data showing a decline in diversity climate (1.99 points) and learning quality (3.32 points) in the 2024 education report.

3.8 Product Design and Development

The E-learning APIK platform was designed based on curriculum objectives, student characteristics, and principles of interactivity and inclusivity. While the platform integrates structured learning materials, multimedia content (videos, visuals), interactive quizzes with feedback, downloadable resources, and communication features. Rather than

focusing solely on content delivery, the platform was designed to promote engagement, reflection, and collaborative learning, which are essential for diversity education.

3.9 Validation and Revision

Following development, the platform underwent expert validation. Feedback from validators led to several improvements, including simplification of instructional language, addition of glossary features, and refinement of content structure. These revisions ensured that the platform met pedagogical, technical, and linguistic standards before implementation.

3.10 Product Trial

The revised platform was implemented in a classroom setting involving 35 students. The trial aimed to evaluate effectiveness through pre-test and post-test comparison, assess user responses from students and teacher, observe student engagement and participation. The trial results formed the basis for the final evaluation of the platform's feasibility and effectiveness.

4 Result

4.1 Needs Analysis

The needs analysis aimed to identify students' learning challenges and preferences in diversity education. The findings reveal a strong demand for interactive and engaging learning media. All respondents (100%) indicated a preference for interesting learning media, while 91% reported that digital media such as animations and videos enhance their learning experience. Additionally, 80% of students experienced difficulty understanding diversity-related material when delivered through conventional oral instruction, whereas all students (100%) found it easier to understand content when presented through interactive media.

The findings revealed that 94% of students had no prior exposure to web-based learning platforms, including Google Sites. However, the same proportion expressed strong interest in using interactive digital learning tools independently. Furthermore, 97% of students reported better concentration when learning with media compared to traditional teaching methods, and all respondents (100%) expressed the need for more frequent use of learning media in diversity education. Figure 1 shows the description of the students' needs analysis results.

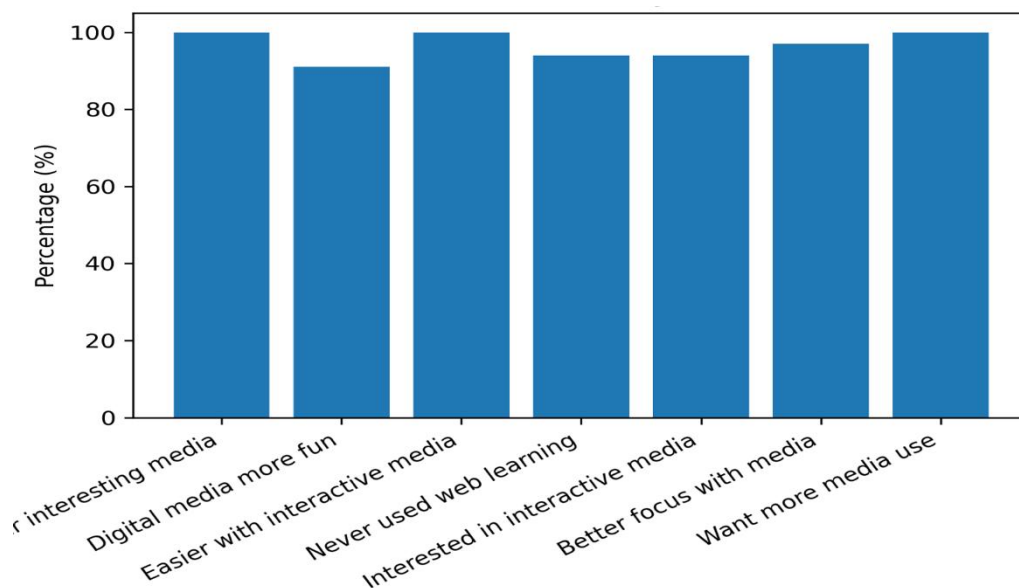


Figure 1 Students' needs analysis results

4.2 Overview of the E-learning APIK Platform

Based on the identified needs, the E-learning APIK platform was developed using Google Sites as a web-based learning environment. The platform integrates instructional content, multimedia elements, and interactive features to support diversity education. Figure 2 shows the home page of the platform with the tagline “Strong Communication, Great Organisation” and a brief introduction to E-learning APIK as a strategic partner in building an effective and impactful inclusive culture.

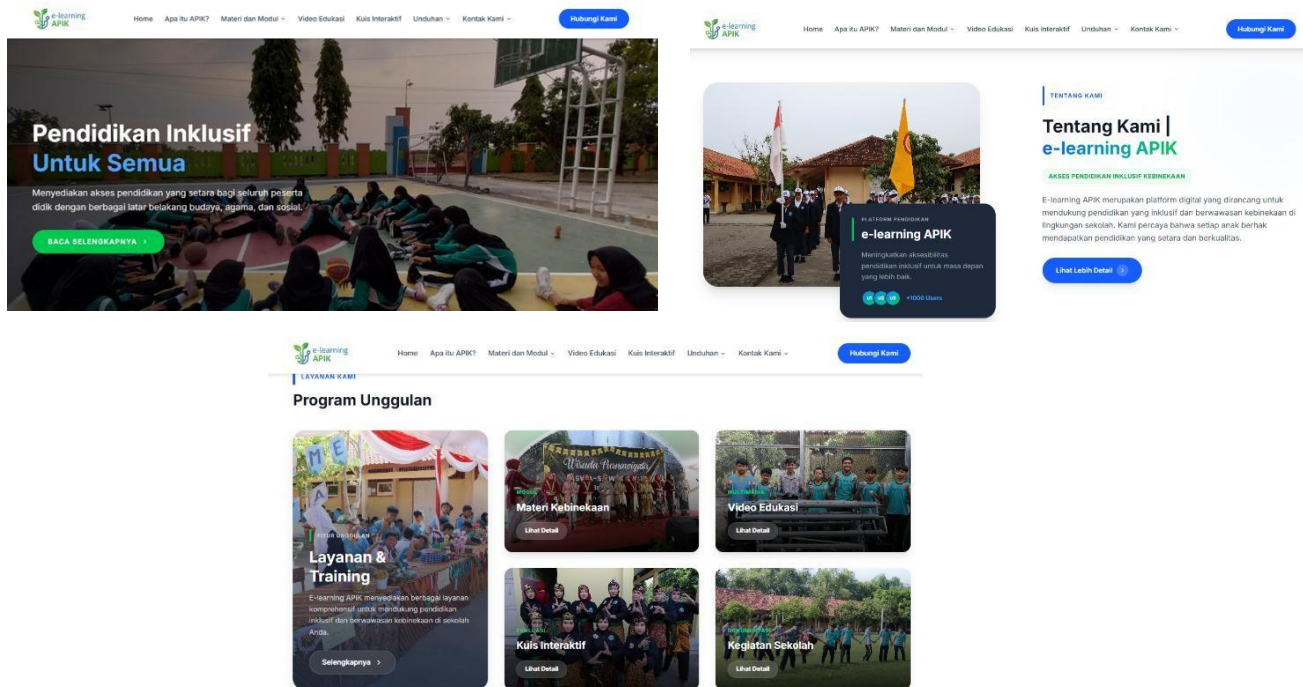


Figure 2 Home page of the E-learning APIK Platform

The platform features structured learning modules that present diversity and inclusivity concepts systematically. It also incorporates multimedia content (videos, images, and text) covering diversity, culture, tolerance, and Pancasila values in a format tailored to junior high school students (Figure 3). In addition, the platform provides interactive quizzes with immediate feedback to reinforce understanding, downloadable resources to support independent learning, and user-friendly navigation to facilitate accessibility and ease of use. The design emphasises active engagement and reflective learning, enabling students to explore diversity concepts in a more meaningful and contextualised manner.

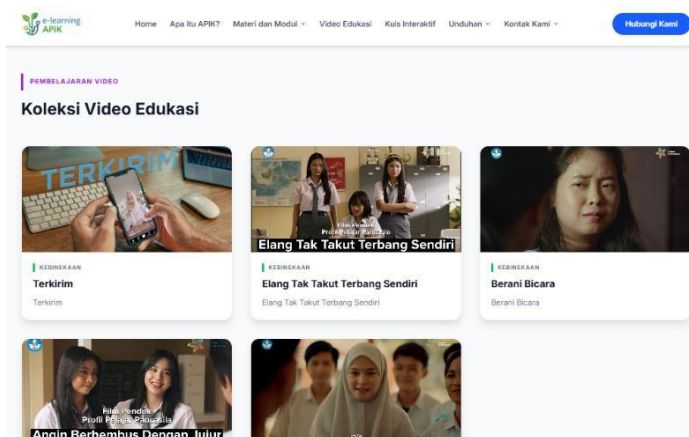


Figure 3 Educational Videos section of the E-learning APIK Platform

4.3 Feasibility of the E-learning Platform

The feasibility of the E-learning APIK platform was evaluated through expert validation involving media, material, and language experts. The results are presented in Table 4.

Table 3 Feasibility of Learning Media

Validator	Average Score	Category
Media Expert	3.75	Highly Feasible
Material Expert 1	3.83	Highly Feasible
Material Expert 2	3.67	Highly Feasible
Language Expert 1	4.00	Highly Feasible
Average	3.75	Highly Feasible

The overall average score of 3.75 indicates that the platform is highly feasible and suitable for implementation without major revisions. High ratings from material experts suggest that the content is relevant and aligned with learning objectives, while the media expert evaluation reflects strong usability and design quality. The language expert assessment further confirms that the platform uses clear and appropriate instructional language.

4.4 User Responses

User responses were collected from students and the teacher after the implementation of the platform. The results indicate highly positive perceptions of the E-learning APIK platform. Student response score: 3.81 (very positive category), while teacher response score: 3.60 (very positive category). Students reported that the platform was engaging, easy to use, and helpful in understanding diversity-related concepts. The integration of multimedia content and interactive quizzes contributed to increased motivation and participation. Similarly, the teacher indicated that the platform supported instructional delivery, enhanced student engagement, and provided a more structured and interactive learning environment. These findings reinforce the feasibility results, indicating that the platform is not only technically sound but also well accepted by its users.

4.5 Effectiveness of the E-learning APIK Platform

The effectiveness of the E-learning APIK platform was evaluated using a pre-test and post-test design. The improvement in students' understanding of diversity climate and learning quality was measured using the normalised gain (N-gain).

Table 4 Pre-test, Post-test, and N-gain Results

Variable	N-gain	Category
Diversity Climate	0.33	Moderate
Learning Quality	0.33	Moderate

The results show an average N-gain score of 0.33, which falls within the moderate category, indicating a meaningful improvement in both diversity climate understanding and learning quality following the implementation of the platform. The observed improvement suggests that the use of multimedia content, interactive assessments, and structured learning materials contributed to increased student engagement and comprehension. The platform enabled a more active and student-centred learning process, allowing students to explore diversity concepts more interactively and contextually.

5 Discussion of Findings

5.1 Student Needs and the Role of Interactive Learning Media

The needs analysis results (Figure 1) clearly indicate a strong demand for interactive and engaging learning media among students. The fact that all respondents expressed a preference for interesting learning media, alongside the high percentage reporting improved understanding through interactive tools, suggests that traditional, teacher-centred methods relying heavily on oral instruction are failing to meet the requirements of today's digital natives. This finding is critically supported by other studies indicating that 65% of teachers still predominantly use lecture-based instruction, despite 70% of students preferring technology-enhanced environments (Fitriyah & Turmudzi, 2025). Furthermore, the needs analysis highlights that the majority of students struggle to understand diversity-related material through conventional oral instruction, yet all the students find interactive media more effective for comprehension. This critical gap is often attributed to the abstract nature of traditional textbooks, which lack the visualisation necessary to engage younger learners (Kurniawati & Ramadan, 2025). Without interactive media, students frequently experience boredom, sleepiness, and a lack of concentration, leading to suboptimal internalisation of core values (Alsawaries & Khataybeh, 2021). In contrast, the sources suggest that interactive media such as Google Sites enhances concentration for 97% of students, aligning with Mayer's cognitive theory of multimedia learning, which posits that combining text, audio, and visuals improves memory retention (Fitriyah & Turmudzi, 2025).

A critical point of discussion is the lack of prior exposure to web-based platforms. Despite the majority of students having no previous experience with Google Sites, the same percentage expressed a strong desire to use such tools independently. This suggests that the barrier is not a lack of interest or digital literacy, but rather a lack of institutional infrastructure and teacher readiness (Mathebula et al., 2025). Other literature emphasises that while students are eager for digital autonomy, teachers often resist shifting away from "banking concept" education due to the significant workload and limited technical training required to manage digital platforms (Sundari et al., 2024).

The role of interactive media extends beyond mere engagement; it is a facilitator for inclusive education. For students who struggle with social interaction or traditional classroom pressures, digital platforms can reduce anxiety and provide a safer environment for independent exploration (Figuccio, 2020). Furthermore, Google Sites allows for differentiated learning, enabling educators to tailor content to diverse student abilities and learning paces, a core principle of the Merdeka Curriculum (Fitriyah & Turmudzi, 2025). However, the discussion must remain critical of the "digital divide." While platforms like E-learning APIK are highly feasible, their efficacy is inherently limited by unequal access to devices and stable internet connectivity, particularly for students from lower-income backgrounds (Figuccio, 2020).

However, the needs analysis underscores that interactive learning media is no longer a luxury but a necessity for improving school climates and instructional quality. The transition from teacher-centred monologues to student-centred digital inquiry is essential to foster critical thinking and the "4C" skills (Communication, Collaboration, Critical Thinking, and Creativity) required in the 21st century (Sundari et al., 2024). For these platforms to be successful, schools must move beyond a compliance mindset and proactively address the human and structural barriers that prevent technology from being fully integrated into the classroom (Lomellini et al., 2025).

5.2 Feasibility of the E-learning APIK Platform

Demonstrate that the developed platform meets high standards across content, media design, and language, as indicated by the overall "highly feasible" rating. This high rating is consistent with other contemporary studies on Google Sites-based media, such as the guided inquiry-based social studies media, which received "very good" validation scores from media, material, and language experts (Sundari et al., 2024). Furthermore, the APIK platform's success in material validation mirrors the 90.32% validity recorded in studies developing Google Sites for Pancasila education, suggesting that this platform is an exceptionally robust vehicle for delivering value-based character education (Kurniawati & Ramadan, 2025).

A critical factor in the APIK platform's feasibility is its alignment with learning objectives and the Merdeka Curriculum. Material experts provided high scores, confirming that the content is both relevant and systematically structured. This stands in contrast to previous research on web-based learning for physics, where the learning design was criticised

for being insufficiently relevant to basic competencies (Ramadannisa & Hartina, 2021). The APIK platform avoids this pitfall by integrating multimedia elements such as videos, interactive quizzes, and structured modules that explicitly target the “4C” skills (Critical Thinking, Communication, Collaboration, and Creativity) (Sundari et al., 2024). The feasibility of Google Sites is further enhanced by its low-code environment, allowing educators to create professional-grade digital environments without advanced programming skills, thereby lowering the technical barrier to entry for teachers (Ramadannisa & Hartina, 2021).

The high Language Expert validation score for the APIK platform is particularly noteworthy. This perfection in linguistic clarity is supported by other research where language experts provided a 100% validity score (Kurniawati & Ramadan, 2025). In a junior high school context, the use of clear, straightforward, and age-appropriate language is not merely a technical requirement but a pedagogical necessity. Studies indicate that high readability reduces cognitive load and allows students, particularly those with learning difficulties or those struggling with traditional textbooks, to focus on the internalisation of complex values like tolerance and diversity (Lomellini et al., 2025).

Despite these high validation scores, a critical discussion must address the discrepancy between expert validation and real-world implementation. While the platform is technically sound, its practical feasibility is inherently tied to school infrastructure. Other studies highlight that while 70% of students prefer tech-enhanced learning, 65% of teachers still rely on lectures due to a shortage of digital devices and unstable internet connectivity (Fitriyah & Turmudzi, 2025). The highly feasible rating of APIK assumes a level of digital access that may not exist in all under-resourced schools. Furthermore, there is a risk that high feasibility scores encourage a compliance mindset where the technology is used simply to tick a box for digital transformation rather than fostering a genuine social model of education that proactively addresses learner variability and inclusivity (Lomellini et al., 2025).

Hence, the E-learning APIK platform is a theoretically and technically superior learning medium that sets a benchmark for diversity education in junior high schools. Its feasibility is validated by its user-friendly design and strong pedagogical alignment. However, for this feasibility to translate into sustained educational impact, schools must move beyond the prototype phase and address the structural barriers of the digital divide (Fitriyah & Turmudzi, 2025). The platform represents a decisive step toward a more inclusive educational system, but its ultimate success depends on continuous teacher professional development and institutional buy-in to ensure technology is an active facilitator of learning rather than a passive resource.

5.3 User Acceptance and Engagement

User response results further reinforce the platform’s feasibility by demonstrating high levels of acceptance among both students and teachers. These results indicate that the platform successfully moved beyond a mere digital repository to become a meaningful environment for understanding complex diversity-related concepts. This high level of acceptance is echoed across several contemporary studies; for instance, research on Google Sites for Pancasila education recorded a 100% positive response from both teachers and students, while studies on inquiry-based media showed that student response activities reached an effective N-gain of 77.99 (Sundari et al., 2024). This widespread enthusiasm suggests that digital platforms are meeting a deep-seated student demand for more interactive and visually stimulating learning environments (Munawirah & Sitompul, 2024).

A driver of this high engagement is the integration of multimedia and interactive quizzes, which students explicitly cited as helpful for their comprehension. Literature supports this by noting that technology creates a dynamic learning environment that connects abstract concepts to authentic, real-world situations, thereby enhancing concentration and the learning curve (Navas-Bonilla et al., 2025). Furthermore, the transition from being a passive recipient of info, a common result of the 65% lecture-based instruction seen in conventional classrooms, to an active participant through critical creation is essential for developing 21st-century skills (Fitriyah & Turmudzi, 2025).

Beyond academic achievement, user engagement is deeply tied to the affective benefits of digital learning. Critical discussion from the attached literature suggests that web-based platforms like Google Sites can reduce student anxiety (Figuccio, 2020). In distance or digital learning settings, students often feel a greater sense of control and agency over their learning process, which is particularly beneficial for those who struggle with the social pressures of a physical classroom (Lomellini et al., 2025). The anonymity and flexibility of digital tools allow students to learn at their own pace without the fear of appearing dumb in front of peers, a factor that likely contributes to the very positive student responses recorded for the APIK platform (Figuccio, 2020).

Despite the high scores, it is noteworthy that the teacher response was slightly lower than the student response. While still very positive, this discrepancy highlights a critical barrier identified in forward-looking literature: teacher readiness and workload. While 70% of students prefer tech-enhanced learning, many educators remain hesitant due to limited technological proficiency and the significant time required to design and manage differentiated digital materials (Fitriyah & Turmudzi, 2025). There is a risk that instructional designers and developers prioritise expert-validated prototypes while underestimating the institutional resistance and infrastructure challenges, such as the digital divide and unstable internet that teachers face in daily implementation (Lomellini et al., 2025).

5.4 Effectiveness in Improving Learning Outcomes and Diversity Climate

The effectiveness results indicate a moderate improvement in both diversity climate understanding and learning quality, as reflected by an N-gain score of 0.33. While this score indicates a meaningful improvement, a critical analysis reveals a significant reversal of the baseline decline recorded in the 2024 education report card, where diversity climate and learning quality had previously dropped by 1.99 and 3.32 points, respectively. This success is attributed to the platform's multimedia-rich and structured environment, which enabled students to explore complex, value-based concepts in a contextualised manner (Navas-Bonilla et al., 2025).

When compared to other Google Sites-based interventions, the APIK platform's moderate gain is consistent with broader trends in digital pedagogical research. For instance, studies on STEM-based physics websites recorded a similar medium-category N-gain of 0.60 (Ningrum & Jumadi, 2024), while discovery learning using personal sites achieved a 0.63 gain (Ramadannisa & Hartina, 2021). The slightly lower gain in the APIK study may be explained by the abstract nature of diversity climate compared to concrete cognitive subjects like physics or mathematics. However, literature suggests that even moderate gains in value-based education are vital, as digital platforms effectively move students away from passive content reception toward active participation (Navas-Bonilla et al., 2025).

A critical strength of the APIK platform is its simultaneous impact on academic quality and socio-cultural climate. Sources highlight that digital tools like Google Sites do not just deliver information; they create dynamic learning environments that connect students to authentic real-world situations (Navas-Bonilla et al., 2025). This aligns with findings in e-service-learning, where virtual interaction with marginalised groups was proven to increase multicultural competence and understanding of disabilities (Figuccio, 2020). By integrating videos on tolerance and Pancasila values, the APIK platform functions as a technological bridge to equity, mirroring results from other studies where technology-enhanced environments improved both student engagement and academic achievement (Fitriyah & Turmudzi, 2025).

The effectiveness of the platform is likely bolstered by the psychological benefits of distance and digital learning. Studies indicate that interacting through digital platforms can reduce levels of anxiety for students who may feel uncomfortable in traditional face-to-face settings (Figuccio, 2020). The anonymity and self-paced nature of e-learning allows students to explore sensitive topics like diversity without the fear of appearing dumb or facing peer judgment. This sense of agency and control is a primary driver of the positive N-gain scores, as it fosters an environment where students feel safe to internalise inclusive values (Lomellini et al., 2025).

6 Conclusion

This study developed and evaluated the Google Sites-based E-learning APIK platform as an innovative approach to enhancing diversity climate and learning quality in junior high schools. Grounded in a systematic Research and Development (R&D) framework, the platform was designed in response to clearly identified instructional gaps, particularly the limitations of conventional, teacher-centred methods and the lack of engaging media for diversity education. The findings demonstrate that the E-learning APIK platform is both highly feasible and pedagogically effective. Expert validation across media, material, and language dimensions consistently placed the platform in the "highly feasible" category, confirming its technical quality, content relevance, and instructional clarity. Furthermore, very positive responses from both students and the teacher indicate strong user acceptance, highlighting the platform's usability, engagement potential, and alignment with learners' needs. In terms of effectiveness, the platform produced a moderate but meaningful improvement in both diversity climate understanding and learning quality (N-gain = 0.33). While not in the high category, this level of improvement is significant given the abstract and

value-based nature of diversity education. The results suggest that integrating multimedia content, interactive assessments, and structured digital learning environments can foster more active, student-centred learning while supporting the internalisation of inclusive values. Importantly, this study contributes to the literature by demonstrating that digital learning platforms such as Google Sites can extend beyond cognitive outcomes to influence socio-cultural dimensions of education, including inclusivity, tolerance, and school climate. The E-learning APIK platform therefore represents not only a technological innovation but also a practical pedagogical tool for promoting inclusive education in secondary school contexts. However, the study also implies that the successful implementation of such platforms depends on broader institutional factors, including teacher readiness, infrastructure availability, and sustained integration into teaching practice. Without addressing these structural conditions, the long-term impact of digital learning innovations may remain limited.

Limitations of the Study and Future Recommendations

This study was limited to one grade level (VII), one subject area (diversity education), and one school (SMP Negeri 2 Gabus), with a relatively short implementation period (6 months), which may affect the generalisability of the findings. Therefore, future studies are recommended to involve more schools, grade levels, and subject areas, as well as to examine the long-term effects of using E-learning APIK media on the climate of diversity and learning quality.

Additionally, further development of features such as discussion forums, addition of glossaries, variation of multimedia content, and development of mobile applications will enhance the quality and reach of the platform. Research collaboration with education offices for policy integration and replication to other schools facing similar challenges in building a climate of diversity is also highly recommended.

Practical Implications

This study highlights that the critical issue is not whether digital tools work, but how they should be integrated into educational practice to produce meaningful outcomes. For practitioners, the key implication is that effective digital learning is less about platform selection and more about pedagogical design and integration. Schools should prioritise structuring digital environments around guided interaction, reflection, and feedback rather than using them as static content repositories.

For teachers, the implication is a need to reframe instructional roles. Rather than functioning primarily as content deliverers, teachers should act as facilitators of inquiry and discussion, especially when addressing complex and value-laden topics such as diversity. This requires deliberate incorporation of activities that prompt student reflection, perspective-taking, and participation, both individually and collaboratively.

At the classroom level, digital tools should be embedded within routine instructional practice, not treated as supplementary or occasional innovations. Consistency of use is critical for building familiarity, learner autonomy, and sustained engagement. This also implies aligning digital activities with assessment strategies, ensuring that interaction with the platform contributes meaningfully to learning outcomes.

For instructional designers and school leaders, the findings point to the importance of scalable and adaptable design frameworks. Rather than developing one-off platforms, emphasis should be placed on creating reusable structures that can be adapted across subjects, particularly for integrating cross-cutting themes such as inclusivity and character education. Finally, the study highlights that digital learning environments can serve as spaces for socio-cultural learning, not just academic instruction. Practitioners should therefore intentionally design digital content that supports dialogue, empathy, and value formation, positioning technology as a tool for shaping both knowledge and attitudes.

Implications for Policy

The policy implications extend beyond promoting digital adoption to shaping how digital education systems are structured and sustained. First, there is a need to move from technology provision policies to pedagogy-driven digital integration frameworks. Policies should emphasise instructional quality, interaction, and inclusivity as core standards for digital learning implementation. Second, teacher development policies must go beyond basic digital literacy to

include applied digital pedagogy. Training programmes should focus on how to design interactive learning experiences, facilitate online engagement, and integrate value-based content into digital platforms. Without this shift, investments in educational technology are unlikely to translate into meaningful learning improvements. Third, the study reinforces the necessity of addressing systemic inequalities through equitable digital access policies. However, access should be defined broadly to include not only devices and connectivity but also access to high-quality digital content and instructional support systems. Fourth, curriculum policies should recognise digital platforms as vehicles for embedding transversal competencies, including inclusivity, tolerance, and social responsibility. This requires integrating diversity education into digital curriculum standards rather than treating it as an isolated component.

Finally, there is a need for institutionalisation and quality assurance mechanisms. Policymakers should establish guidelines for evaluating digital learning interventions, supporting evidence-based scaling, and encouraging collaboration between schools and researchers. This ensures that digital innovations are not implemented in isolation but are continuously refined and aligned with broader educational goals.

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Ethical considerations

This study was conducted in accordance with ethical standards. Informed consent was obtained from all participants, and confidentiality of data was maintained throughout the research process.

Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this article.

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