



Analysis of Student Perceptions toward Ijen Geopark Project-Based Learning at SMKS 17 Agustus 1945 Cluring

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Abstract

This study aims to describe students' perceptions of Ijen Geopark project-based learning at SMKS 17 Agustus 1945 Cluring, Banyuwangi, including interest, benefits, ease, difficulties, and relevance of integrated learning. School learning is still often separated by subjects, even though one local theme can be studied through history, environmental conditions, and the use of English. Students' perceptions of this type of learning need to be known before it is applied more widely. This research employs a descriptive survey method with a simple mixed methods approach. Research subjects consisted of students from MA Nahdlatul Wathan Licin who participated in integrated Ijen Geopark learning. Data were collected through perception questionnaires, written reflections, and limited interviews, then analyzed using descriptive quantitative and qualitative methods. The results showed that students' perceptions of Ijen Geopark project-based learning were in the positive category with an average score of 82.4%. Students showed high interest in material connected to the local environment (86.7%), perceived benefits in understanding integrated concepts (84.2%), and rated the learning as relevant to daily life (85.5%). However, students also identified difficulties in group coordination (42.5%) and limited technology access (38.3%). This research provides recommendations for developing integrated learning approaches based on local wisdom in vocational high schools.

Keywords: student perceptions, project-based learning, Ijen Geopark, integrated learning, vocational school

INTRODUCTION

Education in Indonesia faces a persistent challenge in creating learning experiences that are integrated, contextual, and relevant to students' lives. The Merdeka Curriculum, implemented nationally, encourages educators

to develop learning that connects multiple subjects through thematic and project-based approaches (Badan Standar, 2022). However, the reality in many schools, including vocational high schools, remains compartmentalized, with subjects taught in isolation from one another (Adinugraha & Ratnapuri, 2020). History is taught separately from biology, and both are taught separately from English, even though a single local theme—such as the Ijen Geopark—could serve as a rich context for learning across all three disciplines. This separation not only limits students' understanding of the interconnections between subjects but also reduces the relevance of learning to students' daily lives.

Field observations conducted at SMKS 17 Agustus 1945 Cluring reveal that while the school is located in close proximity to the Ijen Geopark—a UNESCO Global Geopark designated since 2023—the potential of this local resource has not been fully utilized in learning. The Ijen Geopark spans Banyuwangi and Bondowoso Districts and features a network of geosites, biosites, and cultural sites, with Mount Ijen as its main attraction. It is characterized by a high concentration of volcanic cones, craters, and lava flows, showcasing the complex geological processes that have shaped the region over millions of years. Despite this richness, history lessons at the school remain text-based with minimal use of interactive technology or local context, biology lessons focus on abstract ecological concepts without local examples, and English

instruction emphasizes grammar and generic texts rather than meaningful communication about local issues. This represents a significant missed opportunity for creating engaging, contextual, and meaningful learning experiences.

The Ijen Geopark offers extraordinary potential as a learning resource across multiple disciplines. As a natural laboratory, geoparks provide geographical regions where sites and landscapes of international geological significance are managed with an emphasis on protection, education, and sustainable development. These attributes render geoparks as valuable opportunities for learning resources and experiential educational media. The Ijen Geopark is renowned for its volcanic landscape, unique geological formations, and cultural heritage. Its most prominent attraction is the crater lake, which is famous for being the most acidic lake in the world. The area also features diverse biodiversity, including various endemic species, and rich cultural heritage associated with the Osing people and the historical Blambangan Kingdom. Integrating this wealth of local resources into project-based learning could provide students with authentic, meaningful, and engaging learning experiences that develop multiple competencies simultaneously.

Project-based learning (PjBL) has been recognized as an effective pedagogical approach for developing 21st-century skills, including critical thinking, creativity, collaboration, and communication (Thomas, 2020; Larmer & Mergendoller, 2021). In vocational education, PjBL is particularly relevant as it connects theoretical knowledge with practical application, preparing students for the demands of the workplace (Mutiaraningrum et al., 2023). Research has shown that PjBL in vocational contexts can enhance student engagement, collaboration, and problem-solving skills. Students and teachers report highly positive perceptions of PjBL implementation, particularly regarding engagement, collaboration, and analytical skill development. Furthermore, PjBL is recommended in vocational education for implementing the "Profil Pelajar Pancasila" (P3). However, the specific application of PjBL using local resources such as the Ijen Geopark has not been extensively studied in the Indonesian vocational school context.

Research on the integration of Geopark Ijen into education has shown promising results. Studies on the use of Immersive Virtual Field (IVF) media at Ijen Geosite Geopark found a significant positive relationship between students' perceptions of IVF media and their learning interest, with an

average perception rating of 93.2%. The study highlighted that positive emotions elicited by engaging with IVF media, such as happiness and enthusiasm, significantly enhance learning experiences by boosting motivation, engagement, cognitive functions, and ultimately, educational content retention. Research on Immersive Virtual Reality (IVR) interventions for pro-environmental education at Ijen Geopark showed positive user reactions with "excellent" usability (SUS score = 86.03) and significant increases in cognitive knowledge (average 55.29%, $p < 0.001$) and pro-environmental attitudes with a large effect size. These studies demonstrate the potential of technology-enhanced learning using Geopark Ijen as a context.

Research on the development of history learning modules based on digital tourism and artificial intelligence for cultural conservation among high school students in Banyuwangi found significant increases in local history knowledge (average pre-test score 48.2 increased to 75.6 in post-test, $p < 0.001$), more positive attitudes toward cultural conservation, and expert validation with a very feasible category (content 90.1% and media 88.4%). Teachers rated the module's feasibility with an average of 4.3, and the correlation between digital media use and learning outcomes yielded $r = 0.62$. These findings suggest that integrating Geopark Ijen into learning materials can effectively improve student learning outcomes and attitudes. However, these studies have primarily focused on technology-mediated learning and have not systematically examined student perceptions of project-based learning using Geopark Ijen as a theme.

The research gap addressed by this study is the limited understanding of student perceptions toward integrated, project-based learning using the Ijen Geopark as a thematic context in vocational high schools. While previous research has examined the effectiveness of specific technologies or modules related to Geopark Ijen, few studies have investigated how students perceive the experience of learning through projects that integrate history, biology, and English using a single local theme. Understanding student perceptions is crucial because positive perceptions are associated with increased motivation, engagement, and learning outcomes (Ryan & Deci, 2020). Before implementing integrated, project-based approaches more widely, it is essential to understand how students experience such learning, including what they find beneficial and what challenges they encounter.

The novelty of this research lies in its focus on student

perceptions of integrated, project-based learning using Ijen Geopark as a unifying theme across multiple subjects in a vocational high school context. Unlike previous studies that focused on specific technologies or single-subject modules, this research examines how students perceive the experience of learning history, biology, and English through a single project-based approach centered on their local environment. The study also contributes to the growing body of research on contextual learning in Indonesian vocational education by documenting student perspectives on the benefits and challenges of integrated, project-based approaches. Furthermore, the research provides empirical evidence that can inform the design and implementation of similar approaches in other schools and regions.

This research is grounded in several theoretical frameworks. First, constructivist learning theory provides the foundation for understanding how students actively construct knowledge through project-based experiences (Piaget, 2020; Vygotsky, 2021). Second, project-based learning theory emphasizes the importance of authentic, meaningful projects that require sustained inquiry and the production of tangible outcomes (Thomas, 2020; Larmer & Mergendoller, 2021). Third, the theory of student perceptions highlights the importance of understanding how students experience and interpret learning experiences, as perceptions influence motivation, engagement, and outcomes (Ryan & Deci, 2020). Fourth, place-based education theory emphasizes the importance of learning that is rooted in local places and communities (Gruenewald, 2003; Sobel, 2004). Fifth, the ethnopedagogy framework highlights the value of integrating local wisdom into educational practices (Adinugraha, 2020; Oktavianti & Ratnasari, 2018).

This research is also relevant to current educational policy in Indonesia, particularly the Merdeka Curriculum, which emphasizes project-based learning, contextual learning, and the development of Pancasila student profiles (Badan Standar, 2022). The Merdeka Curriculum provides flexibility for educators to develop learning experiences that are relevant to students' local contexts and that integrate multiple subjects. By examining student perceptions of integrated, project-based learning using the Ijen Geopark, this research provides evidence that can inform the implementation of the Merdeka Curriculum in vocational high schools. The findings can help teachers and curriculum developers understand what aspects of integrated, project-based approaches are most valued by students and what challenges need to be addressed.

MATERIALS AND METHODS

This research employs a descriptive survey method with a simple mixed methods approach. The descriptive survey method was chosen because it allows researchers to describe the current state of student perceptions regarding a particular phenomenon—in this case, Ijen Geopark project-based learning (Creswell & Creswell, 2018). The simple mixed methods approach combines quantitative data from questionnaires with qualitative data from reflections and interviews, providing a more comprehensive understanding of student perceptions than either approach alone (Creswell & Plano Clark, 2018). This combination allows for triangulation of findings and deeper insights into the factors that shape student perceptions.

The research was conducted at SMKS 17 Agustus 1945 Cluring, Banyuwangi, East Java, from January to March 2023. SMKS 17 Agustus 1945 Cluring is a private vocational high school located in Cluring District, Banyuwangi Regency. The school is one of the largest private schools in Banyuwangi and has a reputation for academic and non-academic achievements. The school was selected because of its strategic location near the Ijen Geopark and its interest in implementing innovative teaching approaches aligned with the Merdeka Curriculum. The research subjects consisted of 32 students from MA Nahdlatul Wathan Licin who participated in an integrated Ijen Geopark project-based learning program. Students were selected using purposive sampling based on their participation in the learning program and their willingness to participate in the research.

The project-based learning program involved students working in groups to complete a project related to the Ijen Geopark that integrated history, biology, and English. The project required students to: (1) research the history of the Ijen area, including the Blambangan Kingdom and local communities, (2) investigate the biodiversity of the Ijen buffer area, including flora, fauna, and ecosystems, (3) develop English language skills through research, writing, and presentation, and (4) create a final project (poster, video, or presentation) that integrated their findings. The program was implemented over eight weeks, with students receiving guidance from teachers in history, biology, and English.

Data collection techniques included perception questionnaires, written reflections, and limited interviews. The perception questionnaire was designed to measure five aspects of student perceptions: (1) interest in the topic, (2) perceived benefits of integrated learning, (3) ease of understanding, (4) difficulties encountered, and (5) relevance

to daily life. The questionnaire used a Likert scale format (1-4) to allow for quantitative analysis. Written reflections were collected from students at the end of the program, asking them to describe their experiences, what they

learned, and what challenges they faced. Limited interviews were conducted with a subset of students (n=8) to gain deeper insights into their perceptions and experiences.

Table 1. Details of Subjects, Data Sources, and Data Collection Techniques

No	Subject/Data Source Type	Quantity	Data Collection Technique	Data Collected
1	Students	32 students	Perception questionnaire	Interest, benefits, ease, difficulties, relevance
2	Students	32 students	Written reflections	Experiences, learning, challenges
3	Students	8 students	Limited interviews	In-depth perceptions, suggestions
4	Teacher observations	8 sessions	Observation notes	Student engagement, collaboration, progress
5	Student projects	8 projects	Document analysis	Project quality, integration of subjects

The collected quantitative data were analyzed using descriptive statistics, including mean scores and percentages. The perception data were analyzed using the formula: $\text{Percentage} = (\text{Total score} / \text{Maximum score}) \times 100\%$. The results were then categorized based on the following criteria: 81-100% = Very Positive, 61-80% = Positive, 41-60% = Moderate, and 0-40% = Low (Arikunto, 2010). The qualitative data from written reflections and interviews were analyzed using thematic analysis, following the procedures described by Braun and Clarke (2021), which involve familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. The quantitative and qualitative findings were then integrated in the interpretation phase to provide a comprehensive understanding of student perceptions.

RESULTS AND DISCUSSION

The research revealed that students' perceptions of Ijen Geopark project-based learning at SMKS 17 Agustus 1945 Cluring were generally positive. The results are presented in four main sections: quantitative results from perception questionnaires, qualitative findings from student

reflections, analysis of perceived benefits and challenges, and student suggestions for improvement.

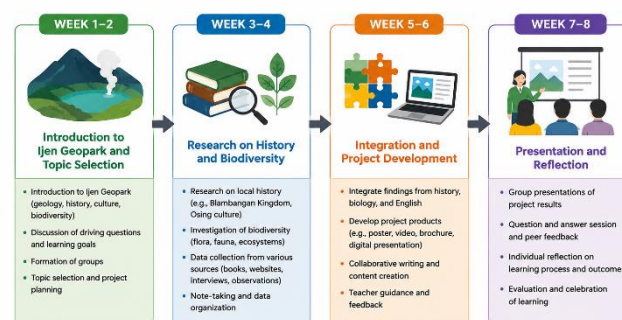


Figure 1. Ijen Geopark Project-Based Learning Implementation Process

The perception questionnaire results revealed positive student perceptions across all five aspects measured. Students' overall perception score averaged 82.4%, placing it in the "Very Positive" category. The highest scores were for interest in the topic (86.7%) and relevance to daily life (85.5%), followed by perceived benefits of integrated learning (84.2%), ease of understanding (78.3%), and perceived difficulties (42.5%—lower scores indicate fewer difficulties).

Table 2. Student Perception Questionnaire Results

Indicator	Score	Max Score	Percentage (%)	Category
Interest in the topic	104	120	86.7	Very Positive
Perceived benefits of integrated learning	101	120	84.2	Very Positive
Ease of understanding	94	120	78.3	Positive
Perceived difficulties	51	120	42.5	Low (few difficulties)
Relevance to daily life	103	120	85.5	Very Positive
Average			82.4	Very Positive

The high score for interest in the topic (86.7%) indicates that students found the Ijen Geopark content engaging and motivating. One student stated, "Saya sangat tertarik karena materi tentang Ijen yang saya kenal dan pernah saya lihat" /

"I am very interested because the material is about Ijen that I know and have seen" (Student Reflection, S-03). Another student noted, "Belajar tentang Ijen membuat saya ingin tahu lebih banyak tentang tempat di sekitar saya" / "Learning

about Ijen makes me want to know more about the places around me" (Student Reflection, S-11). These responses

suggest that connecting learning to local, familiar contexts enhances student interest and curiosity.

Table 3. Student Interest Indicators

Indicator	Percentage (%)	Category
Interest in local content	88.3	Very Positive
Curiosity to learn more	85.0	Very Positive
Engagement during lessons	86.7	Very Positive
Willingness to participate	87.5	Very Positive
Enjoyment of the project	86.0	Very Positive

The high score for perceived benefits of integrated learning (84.2%) indicates that students recognized the value of learning history, biology, and English through a single project. One student explained, "Saya belajar sejarah Ijen, belajar tentang tumbuhan dan hewan di Ijen, dan juga belajar Bahasa Inggris sekaligus" / "I learned Ijen history, learned about plants and animals in Ijen, and also learned

English at the same time" (Student Reflection, S-07). Another student noted, "Saya jadi mengerti bahwa sejarah, lingkungan, dan bahasa itu saling berhubungan" / "I now understand that history, environment, and language are interconnected" (Student Reflection, S-15). These responses suggest that integrated learning helped students see connections between subjects.

Table 4. Perceived Benefits Indicators

Indicator	Percentage (%)	Category
Understanding of integrated concepts	85.8	Very Positive
Connection between subjects	83.3	Very Positive
Development of multiple skills	84.2	Very Positive
Application of knowledge	83.8	Very Positive
Overall learning value	83.8	Very Positive

The high score for relevance to daily life (85.5%) indicates that students found the learning meaningful and applicable to their lives. One student stated, "Saya jadi lebih sadar pentingnya menjaga lingkungan Ijen karena saya tinggal di dekat sini" / "I became more aware of the importance of protecting the Ijen environment because I live near here" (Student Reflection, S-22). Another student noted,

"Pengetahuan tentang sejarah Ijen membuat saya lebih bangga menjadi orang Banyuwangi" / "Knowledge about Ijen's history makes me more proud to be from Banyuwangi" (Student Reflection, S-19). These responses suggest that local content enhances the relevance and meaningfulness of learning.

Table 5. Relevance Indicators

Indicator	Percentage (%)	Category
Connection to daily life	86.7	Very Positive
Practical application	84.2	Very Positive
Cultural identity	85.8	Very Positive
Environmental awareness	85.0	Very Positive
Personal meaning	85.8	Very Positive

The score for ease of understanding (78.3%) indicates that students generally found the content understandable, though some challenges were encountered. One student noted, "Materinya menarik tapi kadang sulit karena banyak istilah baru" / "The material is interesting but sometimes difficult because there are many new terms" (Student

Reflection, S-09). Another student stated, "Saya suka belajar melalui proyek karena lebih mudah dipahami daripada hanya membaca buku" / "I like learning through projects because it is easier to understand than just reading books" (Student Reflection, S-14). These responses suggest that while project-based learning enhances understanding, the introduction of

new terminology can be challenging.

Table 6. Ease of Understanding Indicators

Indicator	Percentage (%)	Category
Clarity of content	80.0	Positive
Understanding of concepts	77.5	Positive
Accessibility of materials	78.3	Positive
Support from teachers	79.2	Positive
Overall ease	76.7	Positive

The score for perceived difficulties (42.5%) indicates that students encountered some challenges, though these were not overwhelming. The most frequently reported difficulties were group coordination (42.5%) and limited technology access (38.3%). One student explained, "Kadang susah koordinasi dengan teman satu kelompok karena jadwal

berbeda" / "Sometimes it's difficult to coordinate with group members because of different schedules" (Student Reflection, S-05). Another student noted, "Akses internet di sekolah kadang lambat, jadi susah mencari informasi" / "Internet access at school is sometimes slow, so it's difficult to find information" (Student Reflection, S-18).

Table 7. Perceived Difficulties Indicators

Indicator	Percentage (%)	Category
Group coordination	42.5	Moderate
Technology access	38.3	Low
Understanding new terms	45.0	Moderate
Time management	44.2	Moderate
Overall difficulties	42.5	Moderate

The qualitative analysis of student reflections and interviews revealed four main themes: (1) engagement and motivation, (2) understanding and connection, (3) collaboration and communication, and (4) challenges and suggestions. Under the theme of engagement and motivation, students reported that the project-based approach was more engaging than traditional instruction. One student stated,

"Belajar melalui proyek lebih seru daripada hanya mendengarkan guru" / "Learning through projects is more fun than just listening to the teacher" (Student Interview, S-02). Another student noted, "Saya jadi lebih semangat belajar karena bisa membuat sesuatu" / "I became more enthusiastic about learning because I could create something" (Student Interview, S-06).

Table 8. Thematic Analysis of Student Reflections and Interviews

Theme	Sub-themes	Example Quotes
Engagement and Motivation	Enjoyment, enthusiasm, creativity	"Belajar melalui proyek lebih seru..." / "Learning through projects is more fun..." (S-02)
Understanding and Connection	Integration, relevance, awareness	"Saya jadi mengerti bahwa sejarah, lingkungan, dan bahasa saling berhubungan" / "I now understand that history, environment, and language are interconnected" (S-15)
Collaboration and Communication	Teamwork, sharing, presenting	"Saya belajar bekerja sama dengan teman-teman" / "I learned to work together with friends" (S-08)
Challenges and Suggestions	Coordination, technology, more activities	"Tambahkan lebih banyak kunjungan lapangan" / "Add more field trips" (S-12)

Under the theme of understanding and connection, students reported that the integrated approach helped them see connections between subjects and understand the relevance of learning to their lives. One student explained, "Saya baru tahu bahwa sejarah Ijen berhubungan dengan lingkungannya" / "I just found out that Ijen's history is

connected to its environment" (Student Interview, S-10). Another student noted, "Belajar tentang Ijen membuat saya lebih peduli dengan lingkungan" / "Learning about Ijen made me more concerned about the environment" (Student Interview, S-16).

Under the theme of collaboration and communication, students reported that working in groups helped them develop teamwork and communication skills. One student stated, "Saya belajar bekerja sama dengan teman-teman yang berbeda pendapat" / "I learned to work together with friends who have different opinions" (Student Reflection, S-08). Another student noted, "Presentasi di depan kelas membuat saya lebih percaya diri" / "Presenting in front of the class made me more confident" (Student Reflection, S-13).

Under the theme of challenges and suggestions, students identified several challenges and provided suggestions for improvement. Common suggestions included: (1) adding more field trips to Ijen, (2) providing better technology access, (3) allowing more time for group work, and (4) including more hands-on activities. One student suggested, "Tambahkan lebih banyak kunjungan lapangan ke Ijen agar kami bisa melihat langsung" / "Add more field trips to Ijen so we can see directly" (Student Reflection, S-12). Another student suggested, "Sediakan lebih banyak waktu untuk kerja kelompok" / "Provide more time for group work" (Student Reflection, S-20).

Discussion

The results of this research provide important insights into student perceptions of Ijen Geopark project-based learning at SMKS 17 Agustus 1945 Cluring. The overall positive perception (82.4%) confirms that students respond favorably to integrated, project-based learning using local themes. This finding aligns with previous research on student perceptions of project-based learning in Indonesian vocational contexts, which has found that students report positive perceptions of engagement, collaboration, and skill development. The very high scores for interest (86.7%) and relevance (85.5%) suggest that connecting learning to local, familiar contexts is particularly effective for engaging vocational students and making learning meaningful.

The high level of student interest in Ijen Geopark content (86.7%) is consistent with research on place-based education, which has shown that learning rooted in local places and communities can enhance student engagement and motivation (Gruenewald, 2003; Sobel, 2004). The Ijen Geopark, as a UNESCO Global Geopark with rich geological, biological, and cultural diversity, provides a compelling context for learning that connects to students' lived experiences. Students in Banyuwangi are familiar with Ijen—many have visited the area or know people who work there—making the content immediately relevant and

accessible. This finding is consistent with research on student perceptions of Immersive Virtual Field learning at Ijen Geosite, which found a significant positive relationship between students' perceptions and learning interest, with an average perception rating of 93.2%.

The high score for perceived benefits of integrated learning (84.2%) supports the argument that integrated approaches can help students see connections between subjects and develop more holistic understanding. Students reported that learning history, biology, and English through a single project helped them understand that these subjects are interconnected and relevant to real-world issues. This finding aligns with research on multidisciplinary literacy, which emphasizes the importance of helping students see connections between disciplines (Mansilla & Duraising, 2021; Klaassen, 2018). The integration of local history, biodiversity, and English in a single project also aligns with the principles of ethnopedagogy, which emphasizes the integration of local wisdom into educational practices (Adinugraha, 2020; Oktavianti & Ratnasari, 2018).

The high score for relevance to daily life (85.5%) indicates that students found the learning meaningful and applicable to their lives. This finding is particularly significant in the vocational school context, where students often value practical, applicable knowledge. Students reported that learning about Ijen's history made them proud of their cultural heritage, and learning about its biodiversity made them more aware of environmental issues. This finding aligns with research on the integration of Geopark Ijen into education, which has shown that such integration can foster cultural conservation attitudes and environmental awareness. The development of pro-environmental attitudes through Geopark-based learning is consistent with research showing that IVR Geopark Ijen interventions are associated with significant changes in pro-environmental attitudes with a large effect size.

The score for ease of understanding (78.3%) indicates that while students generally found the content understandable, some challenges were encountered. The introduction of new terminology in history, biology, and English presented difficulties for some students. This finding highlights the importance of providing adequate scaffolding and support when introducing integrated, project-based approaches. Teachers should ensure that key terms are clearly defined and that students have opportunities to practice using new vocabulary in context. This is consistent with research on content-based language instruction, which emphasizes the

importance of supporting language development while teaching content (Coyle et al., 2010; Lyster, 2018). The use of bilingual materials, as in previous research on booklet development (Sanjaya et al., 2023), could help address this challenge.

The identification of group coordination (42.5%) and limited technology access (38.3%) as the main difficulties encountered by students is consistent with research on project-based learning implementation challenges. Group coordination challenges are common in collaborative learning, particularly when students have different schedules and commitments (Thomas, 2020; Larmer & Mergendoller, 2021). Technology access challenges reflect broader infrastructure issues in Indonesian schools, which have been identified as a barrier to technology-integrated learning (Indrawati & Kuncoro, 2021; Zein, 2022). These findings suggest that successful implementation of project-based learning requires attention to both pedagogical and logistical factors, including providing adequate time for group work, ensuring technology access, and supporting students in developing collaboration skills.

The qualitative findings from student reflections and interviews provide rich insights into the mechanisms through which project-based learning enhanced student engagement and learning. The theme of engagement and motivation reflects the finding that project-based approaches are more engaging than traditional instruction because they allow students to be creative and produce tangible outcomes. This finding aligns with research on project-based learning, which has shown that authentic, meaningful projects can enhance student motivation and engagement (Thomas, 2020; Larmer & Mergendoller, 2021). The theme of understanding and connection reflects the finding that integrated approaches help students see connections between subjects and understand the relevance of learning. This finding supports the argument that integrated, contextual learning can enhance student understanding and retention (Crawford, 2001; Johnson, 2002).

The theme of collaboration and communication reflects the finding that group work helped students develop teamwork and communication skills. This is particularly relevant in the vocational school context, where collaboration and communication are essential workplace skills. Research on vocational students' attitudes toward PjBL in English courses has found that students perceive advantages for their English skills and career aspirations. The theme of challenges

and suggestions provides practical guidance for improving project-based learning implementation. Students' suggestions for more field trips, better technology access, more time for group work, and more hands-on activities reflect their desire for authentic, practical learning experiences. These suggestions are consistent with research on place-based education, which emphasizes the importance of direct engagement with local places (Gruenewald, 2003; Sobel, 2004).

The findings of this research have significant implications for educational practice and policy in Indonesia. First, the positive student perceptions support the implementation of integrated, project-based learning using local themes such as the Ijen Geopark. Schools should consider developing similar approaches that connect multiple subjects through locally relevant themes. Second, the high student interest in local content suggests that teachers should actively incorporate local resources into their teaching. The Ijen Geopark, with its rich geological, biological, and cultural resources, provides an ideal context for such integration. Third, the challenges identified by students—particularly group coordination and technology access—suggest that schools need to provide adequate support for project-based learning implementation, including structured group work protocols, technology infrastructure, and teacher training.

The research also has implications for curriculum development. The Merdeka Curriculum provides flexibility for developing contextual and integrated learning experiences, and the findings of this research support the use of this flexibility to develop project-based approaches using local themes. Teachers and curriculum developers should consider developing modules and projects that integrate history, biology, and English through locally relevant themes such as the Ijen Geopark. The development of such materials should involve collaboration among teachers from different subjects to ensure meaningful integration. Research on the development of history learning modules based on digital tourism and AI for cultural conservation at Ijen Geopark has shown that such materials can be effective and well-received by teachers.

The limitations of this study should be acknowledged. First, the research was conducted at a single vocational school with a relatively small sample, so the findings may not be generalizable to other contexts. However, the consistency of findings with previous research on student perceptions of project-based learning suggests that the patterns identified may be broadly applicable. Second, the study relied primarily

on self-report measures (questionnaires and interviews), which may be subject to social desirability bias. Future research should include direct measures of learning outcomes to complement perception data. Third, the study was conducted over a relatively short period, and the long-term impact of the intervention on student perceptions and learning outcomes has not been assessed. Longitudinal studies would be valuable for understanding how perceptions and outcomes change over time.

The findings suggest several directions for future research. First, experimental studies should be conducted to test the effectiveness of integrated, project-based learning using Ijen Geopark on student learning outcomes across history, biology, and English. Second, research should investigate the specific features of project-based learning that are most effective for different student populations, including vocational students. Third, research should examine the role of technology in supporting project-based learning, including the use of immersive technologies such as VR and AR, which have shown promise in Geopark-based learning contexts. Fourth, research should investigate the transferability of this approach to other regions and contexts, including other geoparks and local themes. Fifth, research should examine the long-term impact of integrated, project-based learning on student environmental awareness, cultural identity, and career readiness.

CONCLUSION

This research successfully analyzed student perceptions of Ijen Geopark project-based learning at SMKS 17 Agustus 1945 Cluring. The findings reveal that students' perceptions of integrated, project-based learning using the Ijen Geopark as a thematic context are generally positive, with an average perception score of 82.4%. Students demonstrated high interest in the topic (86.7%), recognized the benefits of integrated learning (84.2%), and rated the learning as highly relevant to their daily lives (85.5%). Students also reported that the project-based approach enhanced their engagement, helped them see connections between subjects, and developed their collaboration and communication skills. However, students also identified challenges, including group coordination difficulties and limited technology access, which need to be addressed for successful implementation. The qualitative findings from student reflections and interviews reinforced the quantitative results and provided rich insights into the mechanisms through which project-based learning

enhanced student engagement and learning.

The implications of this research are significant for educational practice and policy in Indonesia, particularly in the context of vocational education. First, the findings support the implementation of integrated, project-based learning using local themes such as the Ijen Geopark, which can enhance student engagement, motivation, and learning. Second, the findings highlight the importance of incorporating local resources into teaching to make learning relevant and meaningful for students. Third, the findings identify challenges that need to be addressed for successful project-based learning implementation, including group coordination and technology access. Fourth, the findings provide evidence that can inform the implementation of the Merdeka Curriculum, which emphasizes contextual, project-based, and integrated learning. Future research should investigate the effectiveness of similar approaches on student learning outcomes across multiple subjects and explore the potential of technology-enhanced learning to support project-based learning in vocational contexts.

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