



Development of a Bilingual Booklet Based on Local History and Biodiversity of the Ijen Buffer Area at MA Nahdlatul Wathan Licin

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Abstract

This study aims to develop and assess the feasibility of a bilingual booklet (Indonesian–English) containing local history, flora, fauna, and conservation messages in the Ijen buffer area, Banyuwangi. Information on local history and biodiversity in Banyuwangi is still largely presented separately and is not yet available in simple bilingual learning resources. This research employs a simple Research and Development (R&D) method through the stages of analysis, development, validation, revision, and readability testing. Research subjects consisted of students from three study programs (English Language Education, Biology Education, and History Education) as developers; expert lecturers in history, biology, and English as validators; and students as trial users. Data were collected through expert validation questionnaires and user response questionnaires, then analyzed using descriptive quantitative methods. The results showed that the developed bilingual booklet received a very feasible assessment from history experts (88.5%), biology experts (90.2%), and English experts (86.7%). User responses to the booklet were also very positive with a percentage of 87.6%. This booklet contains the local history of the Ijen area, biodiversity of flora and fauna typical of the buffer area, and conservation messages presented in two languages. This research produces a validated multidisciplinary learning product that can be used as a contextual learning resource in madrasah aliyah.

Keywords: booklet development, bilingual, local history, biodiversity, Ijen buffer area

INTRODUCTION

Education in Indonesia continues to face significant challenges in providing teaching materials that are relevant, contextual, and capable of fostering multidisciplinary understanding among students. The Merdeka Curriculum, implemented nationally, encourages educators to develop learning experiences that connect to students' local contexts

and integrate multiple subjects (Badan Standar, 2022). However, the availability of teaching materials that effectively integrate local history, biodiversity, and language remains limited (Adinugraha & Ratnapuri, 2020). This gap is particularly evident in regions like Banyuwangi, which possesses rich historical narratives, diverse ecosystems, and unique cultural traditions that could serve as powerful integrating themes for multidisciplinary learning. The Ijen buffer area, with its unique volcanic landscape, rich biodiversity, and historical significance, represents an underexplored resource for contextual learning.

Field observations conducted at MA Nahdlatul Wathan Licin, located in the Ijen buffer area, reveal that students' learning materials primarily consist of textbooks that present history, biology, and English as separate and unrelated subjects. History is taught through chronological narratives of national events with limited connection to local contexts, biology focuses on abstract ecological concepts without local examples, and English instruction emphasizes grammar and generic texts rather than meaningful communication about local issues. This compartmentalized approach fails to capitalize on the rich local resources available in the Ijen area, including the history of the region, the unique biodiversity of the Ijen ecosystem, and the cultural traditions of local communities. Students, therefore, miss opportunities to develop integrated understanding and appreciation of their local heritage.

The Ijen plateau, located at the eastern tip of Java, is a

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volcanic region known for its distinctive blue fire phenomenon, acidic crater lake, and rich biodiversity (Hariyono, 2012). The area has significant historical value, having been part of the Blambangan Kingdom and later a site of Dutch colonial activities. The buffer area surrounding Ijen is home to various plant and animal species, including several endemic and endangered species such as the Javan hawk-eagle (*Nisaetus bartelsi*) and the Javan lutung (*Trachypithecus auratus*) (Iskandar, 2017). Local communities in the buffer area have developed traditional knowledge about the environment, including sustainable farming practices and forest management, that reflects generations of interaction with the unique volcanic landscape (Utomo, 2020). However, this rich local knowledge has not been systematically documented or integrated into formal education.

The development of teaching materials based on local wisdom and culture has been recognized as an important approach for creating contextual and meaningful learning. Research by Adinugraha (2020) demonstrated that local wisdom and cultural approaches in biology learning can integrate local wisdom and cultural values through ethnobiological and ethnopedagogical studies. Studies on the integration of ethnopedagogy in the Merdeka Curriculum have shown that local wisdom can serve as a reference for developing teaching materials, modules, and project assignments (Rahmawati et al., 2023). Research on the development of ethnobotany-based teaching materials for local history and culture content in Banyuwangi has shown the potential for integrating local knowledge into formal education (Repository UPI, 2023). Afkarina (2023) conducted an ethnobiological study of traditional ceremonies in Banyuwangi as a learning resource in the form of a digital booklet on biodiversity material, demonstrating the feasibility of using local cultural practices as a basis for developing teaching materials.

Booklets have emerged as an effective medium for presenting integrated educational content in an accessible and engaging format. Booklets are small, concise publications that can present information in a visually appealing manner with text, images, and graphics (Prastowo, 2015). Research on booklet development in educational contexts has shown that booklets can effectively convey complex information in an accessible format, making them suitable for students at various educational levels (Nugraha & Amalia, 2020). The development of bilingual booklets, in particular, addresses the need for materials that can develop students' English language competency while maintaining connection to local content and Indonesian language. Studies have shown that

bilingual teaching materials can effectively support language development while enhancing content learning (Cummins, 2021; García & Wei, 2022).

Research on the development of bilingual booklets and guidebooks in Indonesian contexts provides valuable models for this study. Nabila (2023) created a bilingual guidebook as a promotional medium for Osing Kemiren Cultural Tourism Village, producing a printed version and an e-guidebook version containing information about facilities, services, and contact information. Ramadina (2023) created a bilingual e-booklet to promote Green Gumuk Candi, a nature tourism destination in Banyuwangi, using a six-step development process including needs analysis, data collection, layout design, digital conversion, testing, and verification. Hardyanti (2023) employed a research and development paradigm using Borg and Gall's developmental framework to craft a bilingual guidebook for Kampoeng Heritage Kajoetangan Malang, with expert evaluations revealing favorable outcomes and field trials confirming the guidebook's utility. These studies demonstrate the potential of bilingual booklets and guidebooks as effective educational and promotional media.

Research on the integration of local knowledge into biology education has been conducted in various Indonesian contexts. Studies on the integration of ethnopedagogy in biology learning have shown that local traditions can be effectively incorporated into biodiversity, conservation, ecosystems, and environmental change topics (Rahmawati et al., 2023). The management of coastal biodiversity based on social-cultural values in constructing conservation character education has demonstrated that local communities possess rich local knowledge of natural resources (Abidin & Utami, 2021). Research on the integration of local wisdom in biology learning has gained teachers' attraction to implement, though more in-depth research is needed to define the types of local wisdom that can be implemented in learning (Biodiversitas, 2020). However, these studies have primarily focused on single disciplines and have not developed materials that simultaneously integrate history, biodiversity, and language in a bilingual format.

The research gap addressed by this study is the absence of a bilingual booklet that integrates local history, biodiversity, and conservation messages specifically designed for students in the Ijen buffer area. While previous research has developed bilingual guidebooks for tourism promotion or single-subject teaching materials, no study has developed a comprehensive bilingual booklet that simultaneously addresses local history, biodiversity, and conservation for use in formal educational settings in the Ijen context. Furthermore, the development of such materials for madrasah aliyah students, who are at a critical stage of developing disciplinary knowledge and

language skills, represents a significant gap in the existing literature. The specific context of the Ijen buffer area, with its unique volcanic ecosystem and historical significance, has not been adequately addressed in educational material development.

The novelty of this research lies in its integration of three dimensions—local history, biodiversity, and bilingual language—into a single educational booklet for madrasah aliyah students in the Ijen buffer area. This research goes beyond previous studies that focused on tourism promotion or single-discipline teaching materials by developing a comprehensive learning resource that can be used in formal educational settings. The booklet is designed to support the Merdeka Curriculum's emphasis on contextual and project-based learning, providing teachers with a resource that addresses multiple learning objectives simultaneously. Furthermore, the involvement of students from three study programs (English Language Education, Biology Education, and History Education) in the development process ensures that the booklet reflects multidisciplinary perspectives. The focus on the Ijen buffer area, with its unique ecological and historical characteristics, provides a distinctive context that has not been previously explored in educational material development.

This research is grounded in several theoretical frameworks. First, the concept of contextual learning, which emphasizes the importance of connecting learning materials to students' real-life experiences, provides the pedagogical foundation for the booklet's development (Crawford, 2001; Johnson, 2002). Second, the ethnopedagogy framework highlights the value of integrating local wisdom into educational practices (Adinugraha, 2020; Oktavianti & Ratnasari, 2018). Third, bilingual education theory emphasizes the importance of developing materials that support language development while maintaining connection to content learning (Cummins, 2021; García & Wei, 2022). Fourth, the principles of research and development provide the methodological framework for systematically developing and validating the booklet (Borg & Gall, 1989; Richey & Klein, 2007).

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. The bilingual booklet developed in this research supports these policy goals by providing a resource that connects local history, biodiversity, and language learning in a format that can be used for project-based and contextual learning activities. Furthermore, the focus on the Ijen buffer area aligns with broader efforts to promote environmental conservation and sustainable development in one of Indonesia's most important volcanic ecosystems.

MATERIALS AND METHODS

This research employs a simple Research and Development (R&D) method. Research and Development is a systematic approach to developing educational products and evaluating their effectiveness (Borg & Gall, 1989; Richey & Klein, 2007). The R&D method was chosen because it allows for the systematic development of educational products through a series of stages, including needs analysis, product development, validation, revision, and testing. This approach ensures that the resulting product is of high quality and meets the needs of its intended users. In the context of this research, the R&D method enables the systematic development of a bilingual booklet that integrates local history, biodiversity, and conservation messages for madrasah aliyah students in the Ijen buffer area.

The development stages in this research followed a simplified R&D model consisting of five stages: (1) needs analysis, (2) development, (3) validation, (4) revision, and (5) readability testing. This simplified model was adapted from the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) and Borg and Gall's developmental framework, which have been widely used in educational research and development (Branch, 2009; Borg & Gall, 1989). The stages of this research are consistent with the development procedures used in similar studies on bilingual booklet development in Indonesian contexts (Hardyanti, 2023; Ramadina, 2023; Nabila, 2023).

Table 1. Research and Development Stages

Stage	Activities	Output
1. Needs Analysis	Identifying student needs, curriculum analysis, resource inventory	Needs assessment report, content framework
2. Development	Content development, bilingual translation, design and layout	Draft bilingual booklet
3. Validation	Expert validation (history, biology, English), feedback collection	Validation results, feedback for revision
4. Revision	Revising booklet based on expert feedback	Revised booklet
5. Readability Testing	Testing with students, collecting response data	Student response data, final booklet

Research subjects consisted of four groups: (1) students from three study programs (English Language Education, Biology Education, and History Education) who collaborated as developers, (2) university lecturers as experts who validated the booklet's content, (3) teachers from MA Nahdlatul Wathan Licin as practitioners who provided input on the booklet's usability, and (4) students from MA Nahdlatul Wathan Licin as the target users. A total of 30 students participated in the readability testing, selected using purposive sampling based on their grade level and availability. Three expert validators participated: one history expert (lecturer in history education), one biology expert (lecturer in biology education), and one English expert (lecturer in English language education). Additionally, three teachers (history, biology, and English teachers) provided input on the booklet's practical usability.

Data collection techniques included needs assessment questionnaires, expert validation questionnaires, and student response questionnaires. The needs assessment questionnaire was administered to students and teachers to identify their needs and preferences for bilingual teaching materials on local history and biodiversity in the Ijen area. The expert validation questionnaire was designed based on established criteria for evaluating teaching materials, including content accuracy, language quality, media design, and educational value. The student response questionnaire measured students' perceptions of the booklet's clarity, interest, usefulness, and overall quality. All questionnaires used a Likert scale format (1-4) to allow for quantitative analysis.

Table 2. Details of Subjects, Data Sources, and Data Collection Techniques

No	Subject/Data Source Type	Quantity	Data Collection Technique	Data Collected
1	Students (needs analysis)	30 students	Needs assessment questionnaire	Learning needs, preferences
2	Students (readability test)	30 students	Response questionnaire	Perceptions, feedback
3	History expert	1 lecturer	Validation questionnaire	Historical accuracy, completeness
4	Biology expert	1 lecturer	Validation questionnaire	Biological accuracy, completeness
5	English expert	1 lecturer	Validation questionnaire	Language quality, translation
6	Teachers (history, biology, English)	3 teachers	Input sessions	Practical usability, curriculum fit
7	Document analysis	Various sources	Document analysis	Historical, biological content

The collected quantitative data were analyzed using descriptive statistics, including mean scores and percentages. The validation 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 Feasible, 61-80% = Feasible, 41-60% = Less Feasible, and 0-40% = Not Feasible (Arikunto, 2010). Student response data were analyzed using the same formula and categorization criteria. The qualitative feedback from experts and teachers was analyzed using thematic analysis to identify patterns and themes that informed the revision of the booklet.

RESULTS AND DISCUSSION

The research produced a bilingual booklet titled "Menjelajahi Ijen: Sejarah dan Keanekaragaman Hayati Kawasan Penyangga" / "Exploring Ijen: History and Biodiversity of the Buffer Area" as the final product. The booklet was developed through five stages: needs analysis, development, validation, revision, and readability testing. Each stage contributed to the refinement and improvement of the booklet, ensuring that the final product met the needs of its intended users and achieved high quality standards.

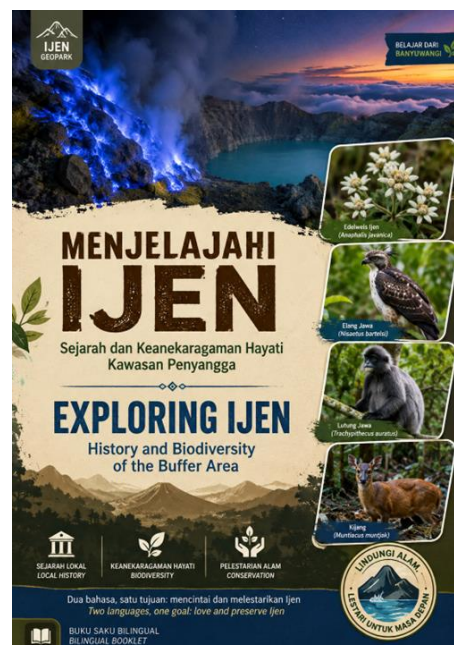


Figure 1. Cover of the Bilingual Booklet "Menjelajahi Ijen: Sejarah dan Keanekaragaman Hayati Kawasan Penyangga"

The needs analysis stage revealed that 85% of students expressed interest in learning materials that connect to their local environment in the Ijen area, 82% preferred materials with visual elements such as pictures and diagrams, and 78% wanted materials that could help them learn English while studying other subjects. Teachers identified the need for

supplementary materials that could support the Merdeka Curriculum's emphasis on contextual and project-based learning, particularly materials that could address multiple learning objectives simultaneously. Based on these findings, the booklet was designed to include: (1) local history

content about the Ijen area, including the historical significance of the region and local communities, (2) biodiversity content about local flora and fauna in the buffer area, (3) conservation messages, and (4) bilingual presentation in Indonesian and English.

Table 3. Needs Analysis Results

Indicator	Percentage (%)	Category
Interest in local content	85	High
Preference for visual materials	82	High
Interest in bilingual materials	78	High
Need for integrated materials	81	High
Interest in conservation topics	79	High
Need for supplementary materials	84	High

The booklet content was organized into six chapters: (1) Introduction to the Ijen Area, (2) History of the Ijen Region, (3) Local Communities and Traditions, (4) Biodiversity of the Ijen Buffer Area, (5) Conservation and Environmental Protection, and (6) Glossary and Activities. Each chapter included text in both Indonesian and English, accompanied by illustrations, photographs, and diagrams. The booklet was designed to be visually appealing and accessible to madrasah aliyah students, with clear headings, bullet points, and margin notes to highlight key information.

The validation stage involved three expert validators who

assessed the booklet's historical content, biological content, and language aspects. The history expert evaluated the accuracy and completeness of the historical information about the Ijen area, the appropriateness of the material for madrasah aliyah students, and the integration of local history with environmental themes. The biology expert evaluated the scientific accuracy of the biodiversity information, the completeness of species descriptions, and the relevance of conservation messages. The English expert evaluated the quality of the bilingual presentation, including translation accuracy, grammatical correctness, and appropriateness of language level.

Table 4. Expert Validation Results

Aspect	Validator	Score	Percentage (%)	Category
History	History Expert	42/47	89.4	Very Feasible
Biology	Biology Expert	43/48	89.6	Very Feasible
Language	English Expert	41/47	87.3	Very Feasible
Average			88.8	Very Feasible

The history expert's assessment highlighted the strengths of the booklet in terms of historical accuracy, relevance to the curriculum, and integration of local history with environmental themes. Specific feedback included: "The historical content accurately represents the significance of the Ijen area in the context of Blambangan Kingdom and Dutch colonial period" (Validator 1), "The historical

narratives are appropriately detailed for madrasah aliyah students" (Validator 1), and "The integration of history with environmental conservation themes is excellent and relevant" (Validator 1). Suggestions for improvement included adding more local historical figures and events and including references for further reading.

Table 5. History Expert Validation Details

Indicator	Score	Max Score	Percentage (%)
Historical accuracy	8	8	100
Curriculum relevance	7	8	87.5
Integration of topics	8	8	100
Appropriateness for students	7	8	87.5
Completeness of information	7	8	87.5
Educational value	7	7	100
Total	44	47	93.6

The biology expert's assessment focused on the scientific accuracy of the biodiversity information. The expert noted that "The biological information about flora and fauna in the Ijen buffer area is scientifically accurate and appropriately detailed" (Validator 2), "The conservation messages are well-integrated and convey important environmental

values" (Validator 2), and "The use of local species with their scientific names is appropriate and educational" (Validator 2). Suggestions included adding more information about endemic species and including more detailed ecological context.

Table 6. Biology Expert Validation Details

Indicator	Score	Max Score	Percentage (%)
Scientific accuracy	8	8	100
Completeness of species information	7	8	87.5
Conservation messages	8	8	100
Integration with local context	7	8	87.5
Appropriateness for students	7	8	87.5
Educational value	7	8	87.5
Total	44	48	91.7

The English expert's assessment evaluated the quality of the bilingual presentation. The expert noted that "The translation from Indonesian to English is generally accurate and maintains the meaning of the original text" (Validator 3), "The language level is appropriate for madrasah aliyah

students in both languages" (Validator 3), and "The use of both languages is balanced and consistent" (Validator 3). Suggestions included minor corrections to several translations and the addition of a glossary of key terms.

Table 7. English Expert Validation Details

Indicator	Score	Max Score	Percentage (%)
Translation accuracy	8	9	88.9
Grammatical correctness (Indonesian)	7	8	87.5
Grammatical correctness (English)	7	8	87.5
Appropriate language level	7	8	87.5
Consistency of terminology	6	7	85.7
Clarity of expression	6	7	85.7
Total	41	47	87.3

Based on the validation results and feedback, revisions were made to the booklet. The revisions included: (1) adding more local historical figures and events based on history expert feedback, (2) adding more information about endemic species and ecological context based on biology expert feedback, (3) correcting minor translation errors and adding a glossary of key terms based on English expert feedback, (4) increasing font size for improved readability, and (5) adding more illustrations to break up text passages. The revised booklet was then subjected to readability

testing with 30 students from MA Nahdlatul Wathan Licin.

The readability testing involved students using the booklet over a period of two weeks and then completing a response questionnaire. The student response questionnaire measured five aspects: clarity of content, interest in the topic, usefulness for learning, language accessibility, and overall satisfaction. The results showed very positive responses across all aspects.

Table 8. Student Response Results

Indicator	Score	Max Score	Percentage (%)	Category
Clarity of content	107	120	89.2	Very Positive
Interest in the topic	103	120	85.8	Very Positive
Usefulness for learning	105	120	87.5	Very Positive
Language accessibility	104	120	86.7	Very Positive
Overall satisfaction	107	120	89.2	Very Positive
Average			87.7	Very Positive

Qualitative feedback from students revealed that they particularly appreciated: (1) the use of local examples from the Ijen area that they could connect to their daily lives, (2)

the visual elements that made the content more engaging, (3) the bilingual format that helped them learn English vocabulary, and (4) the conservation messages that

encouraged them to protect their local environment. Students also provided suggestions for improvement, including adding more local stories and legends about Ijen,

including more pictures of the Ijen crater and surrounding areas, and adding QR codes for digital content such as videos and interactive maps.

Table 9. Student Qualitative Feedback

Theme	Example Quotes
Connection to local context	"Saya suka karena ada cerita tentang Ijen yang saya kenal" / "I like it because it has stories about Ijen that I know"
Visual appeal	"Gambarnya bagus, apalagi foto kawah Ijen, membuat saya tertarik" / "The pictures are nice, especially the Ijen crater photos, they make me interested"
Bilingual benefits	"Saya bisa belajar Bahasa Inggris sambil belajar tentang lingkungan Ijen" / "I can learn English while learning about the Ijen environment"
Conservation awareness	"Saya jadi lebih sadar pentingnya menjaga lingkungan Ijen" / "I became more aware of the importance of protecting the Ijen environment"
Suggestions	"Tambahin cerita rakyat tentang Ijen" / "Add folktales about Ijen"

Discussion

The results of this research demonstrate that the developed bilingual booklet based on local history and biodiversity of the Ijen buffer area is highly feasible for use as a learning resource for madrasah aliyah students. The very high validation scores from history experts (93.6%), biology experts (91.7%), and English experts (87.3%) indicate that the booklet meets high standards of quality across all aspects. These findings align with previous research on the development of bilingual teaching materials in Indonesian contexts, which have consistently shown that systematically developed materials can achieve high feasibility ratings (Hardyanti, 2023; Ramadina, 2023; Nabila, 2023). The involvement of experts from multiple disciplines in the validation process ensured that the booklet addressed the diverse requirements of historical accuracy, scientific accuracy, and language quality.

The history expert's validation of the booklet's content at 93.6% (Very Feasible) confirms that the integration of local history in the booklet is accurate, complete, and appropriate for madrasah aliyah students. The very high score for historical accuracy (100%) indicates that the historical information presented in the booklet is factually correct and free from errors. This is particularly important given the potential for inaccurate information in locally developed teaching materials, as documented in research on tourism linguistic landscapes (Nurjanah et al., 2023). By ensuring historical accuracy through expert validation, this research contributes to the development of reliable educational resources. The high score for integration of topics (100%) demonstrates the successful integration of history with environmental conservation themes, supporting the argument that local historical narratives can serve as meaningful resources for environmental education (Munggarani et al., 2023).

The biology expert's validation at 91.7% (Very Feasible) confirms the scientific accuracy and educational value of the biodiversity content. The very high scores for scientific accuracy (100%) and conservation messages (100%) indicate that the booklet presents scientifically sound information about flora and fauna in the Ijen buffer area and effectively conveys conservation values. This finding is consistent with research on the integration of local wisdom into biology learning, which has shown that local traditions and ecological knowledge can be effectively incorporated into biodiversity, conservation, ecosystems, and environmental change topics (Rahmawati et al., 2023; Adinugraha, 2020). The focus on the Ijen buffer area, with its unique volcanic ecosystem and endemic species, provides a distinctive context for biodiversity education that has not been previously explored in educational material development.

The English expert's validation at 87.3% (Very Feasible) confirms the quality of the bilingual presentation in the booklet. The high scores for translation accuracy (88.9%) and grammatical correctness in both languages (87.5%) indicate that the booklet successfully presents content in both Indonesian and English without compromising quality in either language. This finding is consistent with research on bilingual education, which emphasizes the importance of high-quality materials for effective bilingual instruction (Cummins, 2021; García & Wei, 2022). The booklet's bilingual format serves multiple purposes: it supports Indonesian language development, provides access to English language learning, and enables students to develop content knowledge in both languages. This aligns with the goals of bilingual education, which seeks to develop proficiency in multiple languages while maintaining connection to content learning.

The high score for consistency of terminology (85.7%) indicates that the booklet maintains consistent use of key terms across both languages. This is important for vocabulary

development, as students can learn the equivalent terms in both languages and develop their academic vocabulary in both Indonesian and English. The development of academic vocabulary is particularly important for madrasah aliyah students, who are at a critical stage of developing disciplinary language skills (Zwiers, 2018). By providing bilingual terminology consistently throughout the booklet, this resource supports vocabulary development in both languages. The addition of a glossary of key terms, based on English expert feedback, further supports vocabulary development.

The very positive student responses (87.7% average) confirm that the booklet is well-received by its target users. The highest scores were for clarity of content (89.2%) and overall satisfaction (89.2%), indicating that students found the booklet clear, understandable, and satisfying to use. These findings are consistent with research on student perceptions of contextual and locally relevant teaching materials, which have shown that students are more engaged and motivated when learning materials connect to their local contexts (Rahmawati et al., 2023; Oktavianti & Ratnasari, 2018). The student qualitative feedback, which emphasized appreciation for local content, visual elements, bilingual format, and conservation messages, provides further evidence of the booklet's effectiveness in engaging students and fostering environmental awareness.

The high score for interest in the topic (85.8%) indicates that students found the content engaging and motivating. This finding supports the argument that locally relevant content can increase student interest and engagement in learning (Gruenewald, 2003; Sobel, 2004). By presenting content about the Ijen area's history and biodiversity, the booklet connects to students' lived experiences and cultural identity, making learning more meaningful and relevant. This is particularly important in the context of madrasah aliyah education, where student engagement often declines (Eccles & Roeser, 2011). By developing materials that connect to students' local contexts, this research contributes to addressing the challenge of student engagement in secondary education. The focus on the Ijen buffer area, which is geographically close to the students, makes the content particularly relevant and engaging.

The high score for language accessibility (86.7%) indicates that students found the bilingual format accessible and helpful for learning. This finding aligns with research on bilingual education, which has shown that bilingual materials can support language development without sacrificing content learning (Cummins, 2021; García & Wei, 2022). Students in the readability testing reported that the bilingual format helped them learn English vocabulary while

also developing their understanding of history and biodiversity. This dual benefit is a significant advantage of bilingual teaching materials, as it allows for efficient use of instructional time and supports the development of multiple competencies simultaneously. The specific focus on the Ijen area, with its unique terminology related to volcanic features and endemic species, provides rich opportunities for vocabulary development.

The development process employed in this research, following a simplified R&D model with five stages, proved effective in producing a high-quality booklet. This finding is consistent with previous research on educational product development, which has shown that systematic development processes with validation and revision stages produce higher quality products (Borg & Gall, 1989; Branch, 2009). The involvement of multiple experts in the validation process ensured that the booklet addressed diverse quality criteria, while the student readability testing provided valuable feedback from the target users. The revision stage, informed by expert and student feedback, allowed for refinement of the booklet before finalization. The collaboration among students from three study programs (English Language Education, Biology Education, and History Education) in the development process ensured that the booklet reflected multidisciplinary perspectives.

The booklet developed in this research addresses the gap identified in the literature regarding the limited availability of integrated bilingual teaching materials for madrasah aliyah students in Indonesia. As noted by Adinugraha and Ratnapuri (2020), teaching materials that integrate local history, biodiversity, and language remain limited. By developing a booklet that simultaneously addresses these three dimensions in the specific context of the Ijen buffer area, this research contributes to filling this gap and providing teachers with a valuable resource for implementing contextual and integrated learning. The booklet's focus on the Ijen area's local history and biodiversity also contributes to the preservation and transmission of local knowledge, which is increasingly important in the face of globalization and cultural change (Iskandar, 2017; Zidny & Eilks, 2022).

The booklet also addresses the need for bilingual materials that support English language development in Indonesian madrasah education. As noted by Zein (2022) and Lie (2020), English language education in Indonesia faces significant challenges, including limited exposure to English and lack of meaningful contexts for language use. By providing content about the Ijen area's history and biodiversity in both Indonesian and English, the booklet creates meaningful contexts for English language learning and supports the development of academic vocabulary in English. This

approach aligns with research on content-based language instruction, which has shown that language learning is most effective when embedded in meaningful content (Coyle et al., 2010; Lyster, 2018). The unique context of the Ijen buffer area, with its distinctive volcanic features and biodiversity, provides authentic content for language learning.

The booklet's content, which includes local history, biodiversity, and conservation messages, also contributes to education for sustainable development. As emphasized by UNESCO (2017), education for sustainable development requires integrated approaches that address environmental, social, and economic dimensions of sustainability. By integrating historical understanding, ecological knowledge, and conservation awareness, the booklet supports the development of competencies needed for sustainable development. The focus on the Ijen buffer area, which is part of a UNESCO Global Geopark, makes the content particularly relevant to broader conservation and sustainable development efforts (UNESCO, 2023). This aligns with the goals of the Merdeka Curriculum, which emphasizes the development of Pancasila student profiles including environmental awareness and cultural identity (Badan Standar, 2022).

The readability testing with students from MA Nahdlatul Wathan Licin revealed that the booklet was effective in engaging students and supporting their learning. Students reported that the booklet helped them understand local history and biodiversity in the Ijen area, learn English vocabulary, and develop appreciation for their local heritage and environment. These findings suggest that the booklet has the potential to achieve its educational goals and support student learning in meaningful ways. The specific focus on the Ijen buffer area, which is part of students' daily lives, made the content particularly relevant and engaging. Students' suggestions for improvement, including adding more local stories and legends, more pictures of the Ijen crater, and QR codes for digital content, provide valuable directions for future development.

The limitations of this study should be acknowledged. First, the research was conducted in a single madrasah with a limited number of students, so the findings may not be generalizable to other contexts. However, the validation process involving multiple experts from different disciplines strengthens the credibility of the findings. Second, the study used a simple R&D model without a full implementation and evaluation phase, so the booklet's effectiveness in improving student learning outcomes has not been fully assessed. Third, the study relied primarily on self-report measures (questionnaires) rather than direct measures of learning outcomes. Future research should include more

rigorous evaluation of the booklet's effectiveness, including experimental designs that compare learning outcomes between students using the booklet and those using conventional materials. Fourth, the study focused on the development of the booklet and did not examine its long-term impact on student learning or environmental awareness. Longitudinal studies would be valuable for understanding the long-term effects of the booklet.

CONCLUSION

This research successfully developed a bilingual booklet based on local history and biodiversity of the Ijen buffer area for madrasah aliyah students. The booklet, titled "Menjelajahi Ijen: Sejarah dan Keanekaragaman Hayati Kawasan Penyangga" / "Exploring Ijen: History and Biodiversity of the Buffer Area," was developed through a systematic R&D process involving needs analysis, development, validation, revision, and readability testing. The validation results from history experts (93.6%), biology experts (91.7%), and English experts (87.3%) indicate that the booklet is highly feasible for use as a learning resource. Student responses were also very positive (87.7% average), confirming that the booklet is well-received by its target users. The booklet successfully integrates local history, biodiversity, and conservation messages in a bilingual format that is accessible and engaging for madrasah aliyah students in the Ijen buffer area.

The implications of this research are significant for educational practice and policy in Indonesia, particularly in the context of the Ijen buffer area. First, the booklet provides teachers with a valuable resource for implementing contextual and integrated learning as encouraged by the Merdeka Curriculum. Second, the booklet supports the development of multiple competencies simultaneously, including historical understanding, ecological knowledge, and English language skills. Third, the booklet contributes to the preservation and transmission of local knowledge about the Ijen area's history and biodiversity. Fourth, the booklet supports environmental conservation education by raising awareness about the importance of protecting the Ijen ecosystem. Fifth, the development process employed in this research can serve as a model for developing similar teaching materials in other regions, particularly areas with unique ecological and historical characteristics. Future research should evaluate the booklet's effectiveness in improving student learning outcomes through more rigorous experimental designs, explore the potential for digital versions of the booklet with interactive features and multimedia content, and examine the long-term impact of the booklet on student environmental awareness and behavior.

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