DESIGNING BILINGUAL AND CULTURALLY INCLUSIVE LEARNING MATERIALS: A NEEDS ANALYSIS OF POP-UP BOOKS IN ENGLISH INSTRUCTION

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Article Info	Abstract
	Inclusive education for Deaf students in Indonesia continues to face pedagogical challenges, particularly in English language instruction due to the limited availability of accessible and appropriate learning materials. Deaf learners often experience difficulties in vocabulary acquisition and comprehension when instruction relies heavily on text-based approaches. This study aims to conduct a needs analysis to inform the development of culturally inclusive and bilingual English learning materials for Deaf students. Using a qualitative research design, structured interviews were conducted with two English teachers and eight Deaf students at SLBB YPAC Palembang. The data were analyzed using Target Situation Analysis (TSA) and Present Situation Analysis (PSA) frameworks. The findings reveal that Deaf students require strong visual support and the integration of Indonesian Sign Language (BISINDO) to facilitate vocabulary learning and comprehension. Participants also emphasized the importance of incorporating local cultural elements from Palembang, such as traditional food, arts, and dance, to enhance engagement and strengthen cultural identity. Pop-up books emerged as effective multimodal learning media due to their visual, tactile, and interactive features that align with Deaf students' learning preferences. In conclusion, this study highlights the urgent need for bilingual, multimodal, and culturally responsive English learning materials. The findings provide practical implications for the development of inclusive instructional resources that can reduce learning barriers and promote equitable English language education for Deaf learners.

INTRODUCTION

In recent years, the demand for inclusive education has received significant attention, especially with the instruction of English to children with hearing impairments. Indonesian Law Number 20 of 2003 on the National Education System (Chapter IV, Articles 5 and 32) mandates inclusive education, which ensures learning opportunities for children with impairments or high intellect at the elementary and secondary level. Despite regulatory support for inclusive education, its implementation encounters numerous challenges at the institutional level. Students with hearing impairments experience significant challenges in learning English, primarily due to communication barriers, insufficient accessible material, and an inadequate number of educators skilled in sign language. Deaf students struggle with literacy and reading

because they are unable to learn through auditory methods such as hearing and repetition, while the available instructional materials are limited and inadequate (Luangrungruang & KoKaew, 2022). Therefore, conventional text and audio learning approaches frequently prove insufficient for children with hearing impairments, as they do not align with their visual learning preferences (Knoors & Marschark, 2012). English as a Foreign Language (EFL) teachers in inclusive settings frequently struggle to meet the needs of students with hearing impairments due to insufficient training and a lack of specialized teaching techniques, indicating a clear need for more inclusive pedagogical approaches (Ratnadi and Adnyan, 2023). The current issue highlights the need for pedagogical methods specifically designed for Deaf students.

Deaf students commonly have limited access to spoken language from an early age, potentially hindering their language acquisition progress. A bilingual educational approach using sign language and spoken language has been promoted to enhance literacy and language comprehension among Deaf children (Francisco & Padilla, 2024). Bilingual education for Deaf students indicates an approach that integrates a natural sign language (such as American Sign Language or Indonesian Sign Language) with the local community's written or spoken language (e.g., English or Bahasa Indonesia) as mediums of instruction. Indonesia executed Law Number 8 of 2016 regarding Persons with Disabilities, which guarantees access to inclusive and accessible education through appropriate communication means, including Indonesian Sign Language (BISINDO). Research suggests bilingual education programs that include sign language can substantially enhance the language development and literacy competencies of Deaf learners (Mayer & Leigh, 2010). In addition, the insufficient availability of sign language interpreters remains a major challenge. A deficiency in educators' understanding of Deaf culture also constitutes a significant barrier to the effective implementation of inclusive education.

A multimodal approach has been shown to be an effective pedagogical tool in addressing the learning challenges faced by Deaf students. This method incorporates elements such as images, colors, videos, written text, motion, and gestures to enhance conceptual understanding and literacy. Koulidobrova, Lillo-Martin, and Quadros (2023) highlight that the integration of translanguaging and multimodal transduction enables Deaf students to construct deeper meanings by drawing on multiple visual and linguistic modalities. Similarly, Ikasari, Drajati, and Sumardi (2019) explain that embedding diverse modes such as visual design, motion, written text, and sound into instructional materials can significantly strengthen reading comprehension and literacy development. In addition, instructional approaches should consider students' cultural backgrounds, as culturally responsive materials can further increase engagement and comprehension. Consequently, without multimodal and culturally aligned approaches that match their communication styles, Deaf learners continue to face significant disadvantages in language acquisition.

In the context of Indonesia, incorporating local cultural elements into instructional materials can further enhance the effectiveness of multimodal teaching for Deaf students. Culture-based materials can facilitate the connection between abstract linguistic concepts and students' real-life experiences, hence enhancing their ability to relate to and comprehend the language (Tantri & Santosa, 2024). For example, including aspects of Palembang culture, such as traditional arts, textiles, folklore, local practices, and traditional dishes, provides learners with familiar visual and contextual references that support comprehension and engagement. The integration of local cultural values, such as Palembang culture, into learning materials has been shown to increase students' emotional engagement and make learning more meaningful. Triani, Eryansyah, and Sitinjak (2022) highlight that English proficiency plays a crucial role in promoting Palembang's cultural identity globally, particularly through the creation of culturally rich narrative reading modules inspired by traditional Palembang dishes.

However, learning materials that integrate local cultural elements and are designed specifically for Deaf students are still very limited.

As an initiative to enhance fairness and accessibility in education, visual-based learning media have been increasingly explored. Visual-based e-modules have been found to significantly increase student engagement and enhance learning outcomes in both primary and higher education settings (Francisco, Sulse, & Wang, 2024). Similarly, pop-up books provide an interactive and tactile medium that can complement visually oriented learning materials, offering Deaf learners additional ways to engage with content and reinforce comprehension. A pop-up book features illustrations that are folded and cut to create three-dimensional layers that emerge as the pages are opened, providing an interactive and tactile reading experience (Rorimpandey, 2023). The multisensory nature of pop-up books renders them particularly effective for students who learn best through visual means, including Deaf learners who depend predominantly on visual cues to understand content. Therefore, there is a need for innovative educational media that can integrate cultural content, multimodal features, and bilingual elements to effectively support Deaf learners. In response to this need, theaim to develop pop-up books that combine tactile interactivity, visual elements, local cultural content, and bilingual text, providing an engaging and inclusive learning experience for Deaf students.

Thus, a needs analysis is a critical first step in developing effective educational media for Deaf learners. Needs analysis, or needs assessment, is the process of gathering information to guide the development of a curriculum that addresses the learning requirements of a specific student group (Brown, 1995). Richards (2001, p. 51) explains that the procedures used to collect information about learners' needs constitute a needs analysis. The definition of "needs" is subjective and may vary depending on the perspectives of teachers, students, administrators, staff, parents, and other stakeholders. According to Jordan (1997), needs analysis can be approached in two main ways: Target-Situation Analysis (TSA) and Present-Situation Analysis (PSA). Dudley-Evans and St. John (1998, p. 124) note that TSA focuses on objective, perceived, and product-oriented needs, while PSA examines learners' current strengths and weaknesses in language, skills, and prior learning experiences. In the context of developing educational media for Deaf learners, TSA identifies the goals and outcomes students are expected to achieve, such as bilingual proficiency and cultural understanding, while PSA provides insight into their existing abilities, learning preferences, and challenges. Additionally, collecting input from teachers, who understand students' learning styles and classroom dynamics, ensures that the media developed, such as pop-up books, effectively meets learners' needs and supports language acquisition, engagement, and comprehension.

Several studies in the Indonesian context have examined English teaching practices for Deaf and hard-of-hearing students, with a primary focus on teachers' instructional strategies. For example, Megawati (2020) investigated English instruction in a special school for Deaf students and found that teachers tended to emphasize vocabulary development and simple conversational skills while adapting materials to students' abilities and using sign language and various media. However, the study also revealed challenges related to students' cognitive and emotional characteristics, such as limited memory capacity and diverse hearing levels, which affected classroom instruction. Similarly, Hadi et al. (2019) reported that English teachers of hard-of-hearing students commonly employed drilling and visual scaffolding strategies, including the use of images, videos, gestures, and real objects, to support students' comprehension. In addition, Rahmatunnisa et al. (2019) found that teachers frequently used direct instruction and cooperative learning strategies while facing persistent communication challenges, such as students' limited vocabulary and difficulties in distinguishing similar lip movements, which required repeated explanation and modification of teaching media.

While these studies provide valuable insights into classroom practices and instructional strategies, they largely emphasize teacher-centered approaches and do not sufficiently address

the systematic development of English learning media tailored to Deaf students' needs. Existing research tends to examine vocabulary instruction, visual scaffolding, and communication strategies in isolation, without integrating bilingual approaches, multimodal design, and local cultural content into comprehensive learning materials. Moreover, studies that analyze English learning media needs from both Deaf students' and teachers' perspectives remain scarce. Consequently, there is a lack of needs-based research that can inform the development of English learning media specifically designed for Deaf learners in the Indonesian context.

In response to this gap, the present study adopts a needs analysis approach to identify the English learning media needs of Deaf students and their English teachers. Previous research has focused primarily on teaching strategies or the use of isolated instructional media for Deaf students, while this study adopts a needs-based perspective to inform the development of bilingual, multimodal, and culturally integrated English learning media tailored to Deaf learners in the Indonesian context. By focusing on both learners' and teachers' perspectives, this study seeks to provide empirical insights that support the potential development of pop-up books designed to accommodate Deaf students' visual learning characteristics and cultural contexts.

RESEARCH METHOD
Research Design
This study employed a qualitative research design to explore the experiences, perceptions, and needs of Deaf students and their English teachers in the context of English language learning. A qualitative approach was selected because it allows for an in-depth understanding of participants' lived experiences, perspectives, and contextual challenges, which are essential in needs analysis research. In particular, qualitative methods are well suited to investigating how Deaf students engage with learning materials and how teachers adapt instructional practices to meet diverse learning needs. Rather than manipulating variables, this study focused on capturing authentic classroom realities to inform the development of inclusive, bilingual, and culturally responsive learning media.

Structured interviews were used as the primary data collection method to ensure consistency across participants while still allowing them to express their experiences clearly. This approach was considered appropriate for Deaf students and teachers because it provides guided prompts that support clear communication and focused responses related to learning needs, instructional challenges, and media preferences. The qualitative design aligns with the study's objective of conducting a needs analysis to support the development of English–Sign Language pop-up books for Deaf learners.

Research Participants or Population and Sample
The participants of this study consisted of eight Deaf students and two English teachers from SLBB YPAC Palembang. Participants were selected using purposive sampling, as they were directly involved in English teaching and learning activities and were therefore able to provide relevant and meaningful information related to the research focus. The Deaf students represented different levels of English proficiency and learning experience, while the teachers had experience teaching English to Deaf learners in a special education setting. SLBB YPAC Palembang was selected as the research site because it represents a typical special education institution for Deaf students in Indonesia, characterized by similar instructional challenges, limited access to specialized English learning materials, and comparable teacher qualifications found in many special schools nationwide.

Instruments
Data were collected using structured interview guides designed separately for Deaf students and English teachers. The interview questions were developed based on relevant literature on Deaf education, bilingual learning, multimodal instruction, and needs analysis

frameworks, as well as consultations with the research advisor to ensure content validity. The student interview guide focused on learning experiences, difficulties, preferred learning media, and visual and cultural needs, while the teacher interview guide addressed instructional strategies, challenges, and perceptions of appropriate English learning media. Prior to data collection, the interview guides were reviewed and refined to ensure clarity, accessibility, and suitability for Deaf learners.

Data collection was conducted through structured interviews. For the English teachers, interviews were conducted face-to-face and audio-recorded with participants' consent to ensure accuracy of responses. For Deaf students, interviews were conducted using paper-based written questionnaires, as this method was considered more accessible and appropriate for capturing their responses clearly and comfortably. The students were given sufficient time to read and respond to the questions, and clarification was provided when necessary to ensure understanding. This approach ensured consistency in data collection while respecting the communication needs of Deaf participants.

Data Analysis

Data were analyzed descriptively using Target Situation Analysis (TSA) and Present Situation Analysis (PSA) frameworks. TSA was used to identify learners' goals, expected competencies, and desired characteristics of English learning media, while PSA focused on students' current abilities, learning difficulties, preferences, and prior learning experiences. Interview responses were first organized and coded according to these two categories. Similar responses were grouped to identify recurring patterns and themes related to learning media needs, bilingual support, visual features, and cultural relevance. The analyzed data were then presented in tables to provide a clear and systematic overview of the findings, which subsequently informed the design considerations for developing inclusive English learning media for Deaf students.

RESEARCH FINDINGS AND DISCUSSION
Research Findings

This section presents the findings of the needs analysis based on Target Situation Analysis (TSA) and Present Situation Analysis (PSA) from both Deaf students and English teachers. The findings are organized to directly address the research questions and highlight key needs related to English learning media for Deaf learners.

Student Target Situation Analysis

The Student TSA aimed to identify Deaf students' target needs, learning preferences, and expectations regarding English learning materials. The findings indicate that students prioritize vocabulary mastery, visual support, sign language integration, and engaging learning media.

Table 1
Summary of Student Target Situation Analysis

No	Aspects	Key Findings
1	Main Difficulty	Vocabulary mastery
2	Support needed	BISINDO, pictures, illustrated books, pop-up books, slow explanation
3	Preferred book features	Illustrated, interactive, simple language, games
4	Cultural content	Palembang culture (Food, arts, dances)
5	Learning media preferences	Pop-up books (highly positive response)
6	Additional support	Digital media (e.g., Duolingo) for motivated students

The findings reveal that vocabulary acquisition is the primary learning challenge for Deaf students, confirming the need for learning materials that emphasize visual vocabulary support. Students strongly prefer media that combine pictures, BISINDO, and interactive elements,

indicating that text-heavy materials are unsuitable. The interest in Palembang cultural content demonstrates that culturally relevant materials can enhance engagement and meaning in English learning. Moreover, students' positive responses toward pop-up books suggest that tactile and interactive features are effective in supporting comprehension and motivation.

Student Present Situation Analysis

The Student PSA examined students' current learning conditions, experiences, and abilities in English. Overall, students' proficiency remains basic, but engagement increases with visual and interactive instruction.

Table 2
Summary of Student Present Situation Analysis

No	Aspects	Key Findings
1	Attitude toward English	Mostly difficult and confusing
2	Current textbooks	Text-heavy, difficult, not interactive
3	Preferred activities	Games, picture guessing, writing
4	Teacher Support	Slow explanation, BISINDO use
5	Motivation	Increase visual and interactive media
6	Current ability	Basic vocabulary, simple sentences

The findings reveal a clear gap between students' current English abilities and their desired learning goals. Although students acknowledge the importance of English for communication and personal development, their motivation tends to decrease when learning materials rely heavily on text and lack visual or interactive elements. This condition limits students' engagement and hinders vocabulary development and sentence construction. Teachers' use of BISINDO and slow-paced instruction plays a crucial role in supporting students' comprehension, as it helps clarify meaning and reduces learning barriers. These findings emphasize the need for multimodal learning media that integrate visual support, sign language, and interactive features to better bridge the gap between students' present abilities and their target learning outcomes.

Teacher Target Situation Analysis

Teacher TSA focused on teachers' expectations, preferred instructional methods, and perceptions of effective learning materials for Deaf students.

Table 3
Summary of Teacher Target Situation Analysis

Themes	Key Findings	Interview Excerpts (Both teachers)
Teaching Focus	English instruction for Deaf students primarily focuses on vocabulary mastery rather than complex language skills.	Teacher 1: "Students mostly learn the basics, especially vocabulary." Teacher 2: "The focus is still on vocabulary mastery; writing paragraphs is difficult."
Effective Teaching Methods	Visual-based methods are the most effective for conveying meaning and supporting comprehension.	Teacher 1: "Using YouTube videos or picture cards, because they understand meaning more easily through visuals." Teacher 2: "Using pictures, sometimes videos, but pictures are used more often."
Ideal Learning Materials	Teachers prefer learning materials that are visually rich, simple, bilingual, and supported by sign language.	Teacher 1: "Contains many pictures, simple vocabulary, easy to understand visually." Teacher 2: "Many pictures, Indonesian translation, and accompanied by sign language."

Themes	Key Findings	Interview Excerpts (Both teachers)
Cultural Integration	Integrating Palembang culture is considered important to support identity and meaningful learning.	Teacher 1: "Important, so students learn language and local culture simultaneously." Teacher 2: "Important so students recognize and appreciate local culture, especially Palembang."
Media Preference	Pop-up books are viewed as engaging and suitable for Deaf students' visual learning needs.	Teacher 1: "Very engaging. Should include pictures, simple vocabulary, and topics close to their life." Teacher 2: "Can attract attention; should include pictures, vocabulary, and simple exercises."
Teaching Challenges	Communication barriers and the cost of instructional media remain key challenges.	Teacher 1: "The main challenge is delivering material in a way students understand." Teacher 2: "The biggest challenge is communication and pop-up books are usually expensive."

Teachers emphasized that visual and bilingual materials play a crucial role in facilitating English instruction for Deaf students. Both teachers highlighted that learning materials supported by images, BISINDO, and simple vocabulary help students grasp meaning more effectively and reduce communication barriers in the classroom. They strongly supported the use of pop-up books, noting that the three-dimensional and interactive features can attract students' attention, increase motivation, and make abstract concepts more concrete and easier to understand. In addition, teachers stressed the importance of incorporating local cultural content, particularly elements of Palembang culture, into English learning materials. This emphasis aligns closely with students' preferences, indicating consistency between teachers' instructional expectations and students' learning needs. Such alignment suggests that culturally integrated, visual, and bilingual materials have strong potential to enhance engagement and comprehension in English learning for Deaf students.

Teacher Present Situation Analysis

The Present Situation Analysis (PSA) aims to examine the current teaching practices, student abilities, and instructional challenges faced by teachers when teaching English to Deaf students. The data shows that students' current English proficiency is mostly at a basic level, focusing on vocabulary mastery and simple sentence formation. Writing paragraphs remains challenging for most students.

Table 4
Summary of Teacher Present Situation Analysis

Themes	Key Findings	Interview Excerpts (Both teachers)
Students' English Proficiency	Students' English ability is still at a basic level, with major difficulties in vocabulary retention and sentence construction, especially in writing.	Teacher 1: "Students' abilities are still basic; they can understand simple sentences but have difficulty expressing themselves in writing or speaking." Teacher 2: "Students focus on mastering basic vocabulary; they can form simple sentences, but writing paragraphs is still difficult."

Themes	Key Findings	Interview Excerpts (Both teachers)
Use of Visual Aids and BISINDO	Visual aids and sign language are essential instructional supports to facilitate comprehension.	Teacher 1: "I play a video first, then explain using sign language or writing on the board." Teacher 2: "I attach pictures, teach vocabulary, then guide students to form simple sentences or paragraphs."
Effective Learning Activities	Visual, concrete, and interactive activities are most effective for helping students understand English vocabulary.	Teacher 1: "Illustrations such as videos, pictures, or 3D media are very helpful." Teacher 2: "Real illustrations or 3D pictures are more effective because students can directly connect them with vocabulary."
Suitability of Current Textbooks	Existing English textbooks are not fully suitable for Deaf students because they are text-heavy and require simplification.	Teacher 1: "Not very suitable because they are mostly text-heavy and difficult to understand." Teacher 2: "General school books are still used, but they are usually simplified to be understandable."
Student Engagement in English Learning	Students' motivation is generally low due to vocabulary difficulty, but engagement improves with visual support.	Teacher 1: "Most students are not enthusiastic because memorizing vocabulary and sentence structures is difficult." Teacher 2: "Students are generally happy, but comprehension is still difficult because English is a second language."
Preferred Learning Activities	Picture-based and guessing activities increase students' participation and interest.	Teacher 1: "Picture guessing with cards; students actively point at pictures and guess vocabulary." Teacher 2: "Students enjoy guessing words from images, which makes them more active and interested."

The findings from the teacher interviews indicate that Deaf students' English proficiency remains at a basic level, with vocabulary mastery as the primary focus and persistent difficulties in sentence construction. Both teachers emphasized that visual aids, BISINDO, and interactive activities are essential for facilitating comprehension. Text-heavy textbooks were considered unsuitable and often required simplification. Students showed higher engagement during visually supported and interactive activities, such as picture guessing and the use of three-dimensional media. These findings highlight the need for instructional materials that integrate visual, bilingual, and interactive elements to better support Deaf learners' English development.

Discussion

Needs analysis plays a crucial role in identifying learners' needs, gaps, and expectations, thereby guiding the design of more effective instruction (Brown, 1995; Richards, 2001). In this study, the application of Target Situation Analysis (TSA) and Present Situation Analysis (PSA) provided comprehensive insights into the English learning needs of Deaf students at SLB-B YPAC Palembang. This process is particularly important in Deaf education, as traditional language instruction often fails to accommodate differences in communication modes and visual learning preferences (Musayaroh & Aprilia, 2018; National Deaf Center, 2018). The findings revealed that vocabulary acquisition remains the most significant challenge for Deaf learners, while students demonstrated a strong preference for visually rich and interactive

materials, including pop-up books. This aligns with Birinci and Sarıçoban (2021), who emphasize that visual supports are highly effective in strengthening vocabulary learning among Deaf students.

From a pedagogical perspective, these findings highlight the urgent need for bilingual and multimodal learning materials that integrate visual elements and sign language. Teachers in this study reported that existing textbooks are predominantly text-heavy and require substantial adaptation before being used in class, confirming previous research that identifies limited accessibility of instructional materials as a major barrier in inclusive education in Indonesia (Efendi, Hadi, & Rokhman, 2022). The consistent use of BISINDO and slow-paced instruction by teachers was found to significantly support comprehension, reinforcing the argument that Deaf learners benefit most from instructional approaches that combine sign language with visual and contextual cues. This supports Francisco and Padilla's (2024) assertion that multimodal strategies enable Deaf students to construct deeper meaning and improve literacy outcomes.

Another important implication of this study concerns the integration of local culture into English learning materials. Both students and teachers emphasized the value of embedding Palembang culture, such as traditional food, arts, and dances, into instructional resources. This finding extends Bishop's (1990) concept of culturally responsive materials as "mirrors and windows," suggesting that culturally embedded resources not only enhance engagement but also strengthen learners' cultural identity. In the context of Deaf education, such cultural integration is particularly meaningful, as it allows learners to connect new language input with familiar visual and social experiences. The strong interest in culturally themed pop-up books indicates that learning materials which reflect students' lived experiences can increase motivation and relevance in English learning.

Pop-up books, therefore, emerge as a promising medium for addressing the instructional gaps identified through TSA and PSA. Their tactile, visual, and interactive features align closely with Deaf students' learning preferences and support multimodal meaning-making (Rorimpandey, 2023; Pratiwi, Ariyanto, & Lala, 2022). When designed bilingually and enriched with local cultural content, pop-up books can function not only as vocabulary-learning tools but also as culturally responsive resources that foster engagement and comprehension. These findings reinforce earlier arguments by Mayer and Leigh (2010) and Knoors and Marschark (2012), who highlight the central role of bilingual and multimodal resources in Deaf pedagogy.

Despite these contributions, this study has several limitations. The small number of participants and the focus on a single educational setting limit the generalizability of the findings. Future research could involve a larger sample across different regions to capture more diverse learning contexts. In addition, while this study focused on pop-up books, further research could explore the effectiveness of other multimodal resources, such as instructional videos, interactive applications, or digital storytelling platforms, in supporting Deaf students' English learning. Longitudinal studies examining the impact of such materials on vocabulary development and literacy outcomes would also provide valuable insights.

This study contributes to the growing body of research on inclusive and Deaf education by demonstrating how needs-based, bilingual, multimodal, and culturally responsive learning materials can address persistent instructional gaps. The integration of Palembang culture into English–Sign Language pop-up books represents a context-sensitive and pedagogically sound response to the learning needs identified in this study.

CONCLUSION

This study examined the English learning media needs of Deaf students and their teachers at SLBB YPAC Palembang through a needs analysis using Target Situation Analysis (TSA) and Present Situation Analysis (PSA). The findings demonstrate that Deaf students face

persistent challenges in vocabulary acquisition and sentence construction, largely due to the reliance on text-heavy instructional materials that do not align with their visual learning preferences. Both students and teachers emphasized the necessity of visual, bilingual, and interactive learning resources supported by BISINDO to facilitate comprehension and engagement. The study also revealed a strong preference for culturally relevant content, particularly elements of Palembang culture, which were perceived to enhance motivation, meaning-making, and learners' cultural identity.

From a practical perspective, these findings highlight the urgent need to develop English learning materials that are inclusive, visually engaging, bilingual, and culturally responsive. Pop-up books emerged as a promising instructional medium because their tactile, three-dimensional, and interactive features support Deaf learners' visual and multimodal learning styles. When combined with sign language support and local cultural content, pop-up books have strong potential to address instructional gaps in vocabulary learning, student motivation, and classroom engagement. Teachers' positive responses further suggest that such materials can be feasibly integrated into English lessons, particularly during material introduction, practice activities, and review sessions.

In terms of implementation, bilingual pop-up books can be used as supplementary learning media alongside existing curricula to support vocabulary instruction, introduce new topics, and encourage active participation through visual and hands-on interaction. Teacher involvement in guiding students' interaction with the materials and reinforcing meaning through BISINDO remains essential for maximizing learning outcomes. Future research is recommended to examine the effectiveness of English–Sign Language pop-up books in real classroom settings through experimental or longitudinal designs. Studies involving larger and more diverse participant groups could provide stronger evidence of impact on Deaf students' vocabulary development, literacy skills, and long-term motivation. In addition, further research could explore the integration of other multimodal resources, such as instructional videos, interactive digital applications, or blended learning approaches, to complement pop-up books and expand accessible English learning opportunities for Deaf learners in Indonesia.

INFORMED CONSENT STATEMENT
Participation in this study is entirely voluntary. By agreeing to take part, the participants acknowledge that they have been informed about the purpose, procedures, potential risks, and benefits of the study. Participants understand that their identity are kept confidential and that all information they provide are used solely for research purposes.

DATA AVAILABILITY STATEMENT
The data utilized in this study cannot be made publicly available due to strict adherence to privacy concerns and ethical obligations that safeguard participant confidentiality. This ensures compliance with ethical research standards and data protection regulations.

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