

# Uncovering the Needs for a Web-based Sign Language Model for Deaf Students with American Sign Language (ASL)

Ufi Ruhama<sup>1</sup>, Ryani Yulian<sup>2\*</sup>, Sayidun Nisa Asy-Syifa<sup>3</sup> 

<sup>1,3</sup> Department of Public Health, Universitas Muhammadiyah Pontianak, Pontianak, Indonesia

<sup>2</sup> Department of Management, Universitas Muhammadiyah Pontianak, Pontianak, Indonesia

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## ABSTRAK

Pendidikan inklusif merupakan hak setiap individu, termasuk siswa tunarungu, untuk mendapatkan akses yang setara dalam pembelajaran bahasa Inggris. Penelitian ini bertujuan untuk mengembangkan prototipe model pembelajaran bahasa isyarat berbasis web, menggunakan Bahasa Isyarat Amerika (WEBSL), bagi siswa tunarungu dalam mempelajari bahasa Inggris. Penelitian ini menggunakan pendekatan Research and Development (R&D) dengan model pengembangan ADDIE. Subjek penelitian melibatkan 25 siswa tunarungu dari salah satu Sekolah Luar Biasa (SLB) di Kota Pontianak. Data dikumpulkan melalui analisis isi buku teks bahasa Inggris yang disesuaikan untuk siswa tunarungu, serta wawancara tematik dengan guru berpengalaman, untuk mengidentifikasi kebutuhan pembelajaran siswa yang meliputi inklusivitas, aksesibilitas, kejelasan bahasa, dan preferensi pembelajaran visual. Hasil analisis menunjukkan perlunya model pembelajaran berbasis web yang interaktif untuk memfasilitasi akses siswa tunarungu terhadap materi bahasa Inggris yang disesuaikan. Prototipe yang dikembangkan dalam penelitian ini dirancang agar sesuai dengan kebutuhan, bersifat interaktif, mudah diakses, serta memperhitungkan sensitivitas budaya. Simpulan dari penelitian ini menekankan pentingnya pengembangan sumber daya pembelajaran yang adaptif dan interaktif, serta implikasinya terhadap peningkatan keterampilan bahasa Inggris siswa tunarungu.

## ABSTRACT

Inclusive education is the right of every individual, including deaf students, to have equal access to English language learning. This research aims to develop a prototype of a web-based sign language learning model, using American Sign Language (WEBSL), for deaf students in learning English. This research uses a Research and Development (R&D) approach with the ADDIE development model. The subject of the study involved 25 deaf students from one of the Special Schools (SLB) in Pontianak City. Data was collected through analysis of the content of English textbooks tailored to deaf students, as well as thematic interviews with experienced teachers, to identify students' learning needs that included inclusivity, accessibility, language clarity, and visual learning preferences. The results of the analysis show the need for an interactive web-based learning model to facilitate deaf students' access to customized English language materials. The prototype developed in this study is designed to suit needs, be interactive, easily accessible, and take into account cultural sensitivities. The conclusion of this study emphasizes the importance of developing adaptive and interactive learning resources, as well as their implications for improving the English skills of deaf students.

## 1. INTRODUCTION

Currently, West Kalimantan Province is confronted with limited higher education institutions that offer special services for students with disabilities. West Kalimantan Government has established several inclusive schools and all-encompassing educational establishments spanning from primary to secondary tiers of education. However, there is a limited number of students with disabilities who pursue higher education. Responding to this phenomenon, the government through Ministerial Regulation Number 46 of 2017 provided a legal framework for organizing special education for students with special needs in tertiary institutions. Deaf individuals in Indonesia are familiar with two forms of sign language evolution: the

\*Corresponding author

E-mail addresses: [ryani.yulian@unmuhpnk.ac.id](mailto:ryani.yulian@unmuhpnk.ac.id) (Ufi Ruhama')

Indonesian Sign Language System (SIBI) and Indonesian Sign Language (BISINDO), both of which are prevalent in society (Fitriyani et al., 2024; Nugraheni et al., 2023). Students with disabilities in Indonesia can access the SIBI and BISINDO dictionaries, which facilitate the development of their academic potential. Barriers faced by deaf students are mainly related to limited access to educational resources, including facilities, educators, and teaching materials, not intellectual abilities. Consequently, tertiary institutions must be able to provide inclusive education services to accommodate deaf students and support their advancement into higher education. Inclusive education for deaf people exemplifies the realization of education for all which aims to improve cognitive abilities (Kermit, 2019; Paramansyah & Parojai, 2024). For deaf students, sign language plays an important role as a mediating medium for cognitive understanding in language acquisition.

Previous research has indicated that deaf students require assistive technology to support their language acquisition process. Students with hearing impairments, such as deafness, tend to learn visually, utilizing multimodal elements that integrate verbal and visual semiotics in English language learning (Drajati et al., 2021; Ikasari et al., 2019). Deaf students need an individualized approach to develop their communication skills effectively. In Indonesia, English language instructors currently face challenges in finding online-accessible foreign language learning materials, highlighting the pressing need for the development of assistive technology-based learning resources through sign language (Chen, 2014; Jayanegara et al., 2020). Sign languages are now included in the curricula of numerous universities globally, including institutions in the United States with over 210 universities offering American Sign Language (ASL), the UK, New Zealand, Italy, Germany, and Finland, among others, making ASL the third most widely studied modern language (Ackerman et al., 2018; Clark & Lee, 2018). The necessity to establish a web-based sign language platform based on American Sign Language (ASL) is driven by multifaceted considerations. Primarily, ASL enjoys widespread international recognition since it serves as a common language in international deaf settings and is viewed as a lingua franca (Kusters, 2021; Kusters & Lucas, 2021). Moreover, it possesses a firmly established linguistic framework, augmented by ample educational resources. ASL, beyond its linguistic attributes, exhibits cultural pertinence, demonstrating a nuanced appreciation for the distinct identity of the deaf community (Higgins & Lieberman, 2016; Kožuh et al., 2016). Moreover, prioritizing the current accessibility of digital platforms for individuals with disabilities is crucial, as it can play a role in diminishing the digital divide and fostering inclusivity (Pieri & Cobb, 2019; Yeratziotis et al., 2023). Therefore, the adoption of American Sign Language in English language instruction in Indonesia is highly relevant.

Every higher education institution provides General Basic Course (GBC) English language instruction in every program of study and/or department. Following the advancements of the digital technology era and the emergence of society 5.0, deaf students also need to master the English language. There are numerous scholarship opportunities available for disabled students, including the deaf. Within the English language instruction, there is also a universal sign language that can be introduced to deaf students who wish to acquire proficiency in English. Currently, the Indonesian government has standardized learning technologies accessible online, such as the SIBI and BISINDO dictionaries. There is a pressing need for the development of assistive technology in English language instruction for deaf students in higher education, which can facilitate their English language proficiency. Assistive technology in educational platforms plays a crucial role in facilitating access to learning for students with disabilities, thereby reducing both educational and social exclusion (Al-Dababneh & Al-Zboon, 2022; Lynch et al., 2024). The commitment to enhancing the inclusion of students with disabilities has led to the widespread adoption of assistive technology in the field of education (Fernández-Batanero et al., 2022; McNicholl et al., 2021). For this reason, assistive technology is required in English language instruction through sign language for deaf students in higher education institutions, where they are required to take English language courses in their chosen fields of study. In the context of this study, integrating local culture plays a crucial role in the development of teaching materials for foreign language learning. Understanding and respecting cultural differences is crucial in language production to avoid misunderstandings and learners must consider the cultural context for effective communication in real-life situations (Mustofa & Martina, 2019; Zahara & Rusmawaty, 2022). A more dynamic understanding of how culture is incorporated into teaching materials can explore the processes through which learners actively engage with such materials. The underpinning conclusion is that adding local content to web-based sign language resources can bring significant value and benefits (Canale, 2016; Keles & Yazan, 2023).

The analysis of needs is grounded in legal foundations and frameworks, such as Law Number 20 of 2003 concerning the National Education System, specifically Article 5(2), which mandates that "citizens with physical, emotional, mental, intellectual, and/or social disabilities have the right to acquire special education." Globally, special and inclusive education has also received significant attention worldwide over the past few decades underscoring the importance of promoting inclusivity and highlighting the necessity

to address various instances of exclusion, marginalization, disparities, and inequalities in terms of access, participation, and educational outcomes (Ainscow, 2020; Ydo, 2020). In the era of digital technology and society 5.0, English continues to be an important language to be mastered and taught in both public and private higher education institutions. Disabled students, such as the deaf, have the right to inclusive and universal foreign language instruction, and it is the responsibility of researchers and instructional material developers in foreign language acquisition to meet those needs. However, the reality is that the use of sign language by deaf individuals in learning foreign languages like English tends to be overlooked due to limited multilingual materials, leading researchers in foreign language acquisition to form broader communities.

The novelty of this study is that this study focuses on an in-depth exploration of the needs of deaf students in learning English using web-based sign language models, which are still rarely discussed in the academic literature. This study examines how deaf students can utilize American Sign Language (ASL) through a web-based platform in an effort to improve the accessibility and effectiveness of English language learning. This study aims to explore and explain the specific needs of deaf students in accessing English learning materials that suit their needs, as well as the importance of integrating ASL into technology-based educational experiences. By identifying challenges and opportunities in the development of inclusive and interactive web-based learning models, it is hoped that this research can make a significant contribution in providing adaptive and responsive solutions to the needs of deaf students in English language proficiency.

## 2. METHOD

The study was conducted using the ADDIE model. Given that the study was specifically centred on needs analysis, its focus lies on evaluating the teaching material (herewith English text based on Curriculum K-13) used for deaf students. The prototype of assistive technology developed in the study adopted the ADDIE model, encompassing analysis, design, development, implementation, and evaluation phases (Branch & Kopcha, 2014; González & Quiroz, 2019). The current study merely focused on conducting the need analysis, designing the model, and developing the prototype of the model. The analysis involved 25 deaf students and one experienced teacher, who utilized a special textbook for teaching purposes. Need analysis was used as a fundamental process of gathering information to inform the development of material tailored to the specific learning needs of a particular group of students (Hariyadi & Yanti, 2019; Mubar, 2015). Conducting a needs analysis at the outset of a course is essential before determining learning objectives, establishing assessments, designing the course, and crafting educational materials (Masykar & Nurrahmi, 2020; Sari et al., 2020). The development model used in this study can be seen in Figure 1.

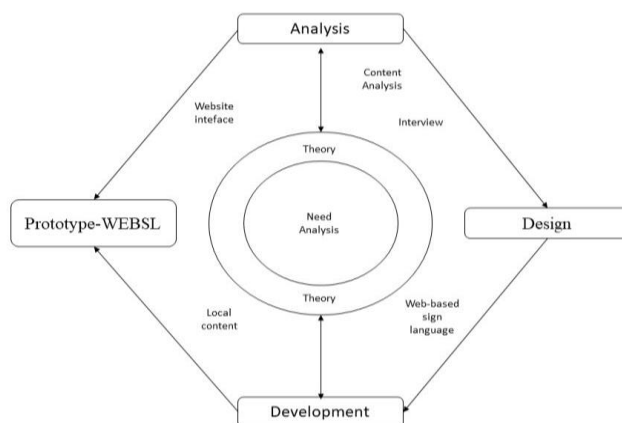


Figure 1. WEBSL Development Model

The initial phase of developing this assistive technology involves analysis, which is a fundamental step within the scope of analyzing the needs for the creation of a web-based sign language for deaf students learning English with American Sign Language (ASL). This stage encompassed an analysis of the needs of deaf students in alignment with instructional learning objectives and intended outcomes. The needs analysis was also conducted through relevant content analysis on a book concerning English language material for deaf students. Content analysis of a book is worth considering why available textbook exists, what they mean and to whom, how they interact between antecedent and subsequent situations, and, finally, whether they are relevant and addressed. Data analysis for analyzing the content of the book involved applying the checklist development model used in textbook evaluation (Medina, 2016; Nugraheni et al., 2023) as shown in Table 1.

**Table 1. Content Analysis Instrument Grids**

Criteria	Description
Inclusivity and accessibility of the book	Evaluate the inclusivity and accessibility of the content for deaf students on backgrounds, experiences, perspectives, and different formats.
Topic Coverage	Assess whether the topics covered in the textbook align with the language learning objectives of deaf students for communication.
Language Clarity	Assess the suitability of the complexity of language in the textbook for deaf students, considering vocabulary and sentence structure, and determining the clarity and conciseness of students' explanations, especially on visual cues.
Interactive Activities	Assess the activities and exercises in the textbook to determine if they address various learning styles and preferences, including visual and interactive methods.
Cultural Sensitivity	Assess the existence of cultural diversity and sensitive to the needs of deaf students.

The second instrument was a semi-structured interview with an English teacher at one SLB in Pontianak city. The results of the interview were coded by the use of NVivo QSR 12 and followed the thematic analysis approach outlined involving the transcription of interview data, creating preliminary codes, identifying themes, reviewing those themes, defining and labelling them, and finally, generating a comprehensive report. The second phase involved the design of the technology. The developed material was tailored to the results of the content analysis of a book, and the results of the interview with the teacher, aligned with the standards of American Sign Language (ASL) for students learning English as a foreign language. This stage encompassed the design of the prototype of the application/web theme, creation of instructional materials, sign language video design, menu design, and application interface design. The third phase focused on the development of the Web-Based Sign Language (WEBSL) prototype for deaf students learning English with American Sign Language (ASL) based on local content. This development included conceiving and implementing features according to the planned theme, domain naming, graphic design, and uploading prepared content such as sign language materials and videos.

### 3. RESULT AND DISCUSSION

#### Result

Given that the study focuses solely on needs analysis, its findings can be detailed and demonstrated within the framework of the ADDIE model, sequentially starting from the stages of needs analysis, design, and development. This study undertakes a content analysis involving several elements namely inclusivity and accessibility, topic coverage, language complexity and clarity, activities and exercises. Since this study focused on developing materials for deaf students based on Indonesian local content, the content analysis also examines the element of cultural and contextual sensitivity. The result of the content analysis can be seen in [Table 2](#).

**Table 2. Content Analysis of Textbook for Need Analysis**

No	Element of content analysis	Yes	No
1	Inclusivity and accessibility		
	Does the textbook provide visual aids, pictures or diagrams to support learning? If yes, how often is it used and how effective is it in conveying information?		✓
	Does the course book include explanations or visual representations of sign language? If yes, describe their frequency and effectiveness in aiding understanding.		✓
	Are there examples where the textbook addresses the special learning needs of deaf students (e.g., visual learners, sign language users)? If yes, provide an example.		✓
2	Topic Coverage		
	Evaluate the relevance of the topics covered in the textbook to the language learning goals of deaf students. Are they aligned with practical communication needs?	✓	
	Are there any topics or language skills that you believe are missing from the textbook and should be included to better cater to the needs of deaf students?		✓

No	Element of content analysis	Yes	No
3	Language Complexity and Clarity		
	Assess the complexity of the language used in the textbook. Is the vocabulary and sentence structure suitable for deaf students at various proficiency levels?	✓	
4	Activities and Exercises		
	Evaluate the variety of activities and exercises in the textbook.	✓	
	Do they cater to different learning styles and preferences, including visual and interactive approaches?	✓	
	Are there any activities that could be modified or expanded to better accommodate the learning needs of deaf students?	✓	
5	Cultural and Contextual Sensitivity		
	Does the textbook consider cultural diversity and sensitivity to the needs of deaf students from various backgrounds?		✓
	Are there instances where cultural references may need further clarification or adaptation?		✓

**Results of Interview with Teacher Experienced in Teaching Deaf Students**

The interview conducted with a teacher experienced in teaching deaf students yielded valuable qualitative insights into the unique needs, preferences, and challenges faced by deaf students in the language learning process. The findings from the excerpts of the interview are summarized as follows:

**Individualized Learning Needs**

*Each student has varying language proficiency levels, preferred communication modes (e.g., sign language, written communication), and learning styles. Tailoring instructional strategies and materials to accommodate these differences is crucial for effective learning outcomes.*

**Visual Learning Preference**

*There must be a strong visual learning preference for deaf students. Visual aids, images, diagrams, and videos can be effective tools for conveying information to enhance students' comprehension and engagement.*

**Sign Language Integration:**

*The media should stress the significance of integrating sign language into the language learning curriculum. to bridge understanding and communication, making language learning more accessible and meaningful for deaf students.*

**Digital Learning Tools:**

*The media needs the value of interactive digital tools that facilitate practice, assessment, and self-paced learning with sign language videos and multimedia content.*

**Culturally Relevant Materials**

*Cultural and contextual sensitivity emerged as a crucial consideration. The media should stress the importance of culturally relevant learning materials that reflect the experiences and identities of deaf students. Contextualizing examples and content can enhance engagement and comprehension*

**Collaboration and Professional Development**

*Teachers' need for continuous professional development to equip them with effective strategies for teaching deaf students was highlighted, along with the importance of staying updated on innovative teaching methodologies.*

**Prototype of a Web-Based Sign Language Model for Deaf Students Learning English Using American Sign Language (ASL) based on Local Culture for Indonesian**

Based on the results of book content analysis, and teacher's interview, the study presented the systematic procedure to construct a prototype of a web-based sign language model for deaf students. The procedure consists of five stages as shown in [Figure 2](#).

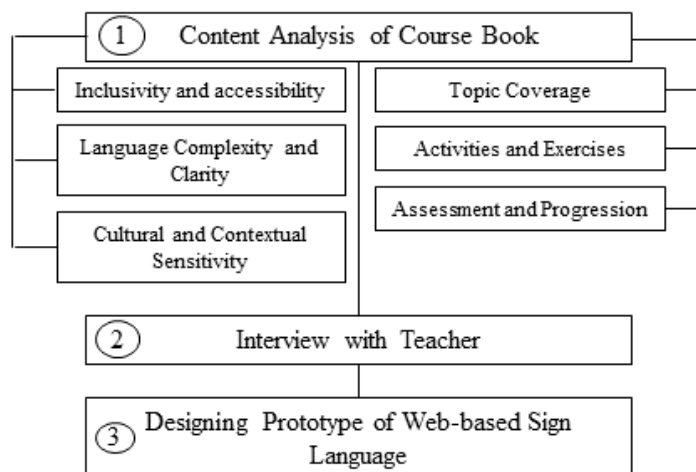


Figure 2. Design Procedure of Prototype of Web-Sign Language Model

This study developed a web-based sign language model for deaf students using American Sign Language (ASL) based on local culture. The interfaces of the websites were arranged by integrating multimodal elements presented with sign language pictures. A multimodal interface can effectively address language communication barriers for deaf students by providing multiple means of communication sign language, text, images, and video to convey and receive information. The prototype of the website was also presented with a basic and straightforward menu. The first screen of the website interface presents and explains the user manual for the website model with step-by-step instructions, functions and features as illustrated in Figure 3.



Figure 3. Website Interface and Menu Layout

As the web-sign language model prepared deaf students to learn English with American Sign Language, the model was equipped with suitable and relevant materials to learn sign language with the alphabet and numbers. The model provides the materials using sign language to learn English with the alphabet and numbers as a valuable approach for deaf students. This method not only assists the students in language acquisition English as a foreign language but also tailors' effective communication skills. They can correlate signs with the corresponding English words and symbols. Learning the English alphabet in sign language entails giving each letter a distinct sign. The American Sign Language (ASL) alphabet, for example, comprises different signals for A-Z. Deaf students can practice using these signals to spell out words and names. This method aids with spelling improvement. Numbers 0-9 and beyond are also represented by signs in sign language. Deaf children can learn to sign numbers, which can help them with fundamental arithmetic abilities, telling time, and understanding numerical ideas. It is supported by a previous study that developed a hand signal recognition model from letters of the alphabet has significant results for language recognition. Based on Figure 4 and Figure 5 we can see alphabet, number, and video sign language.

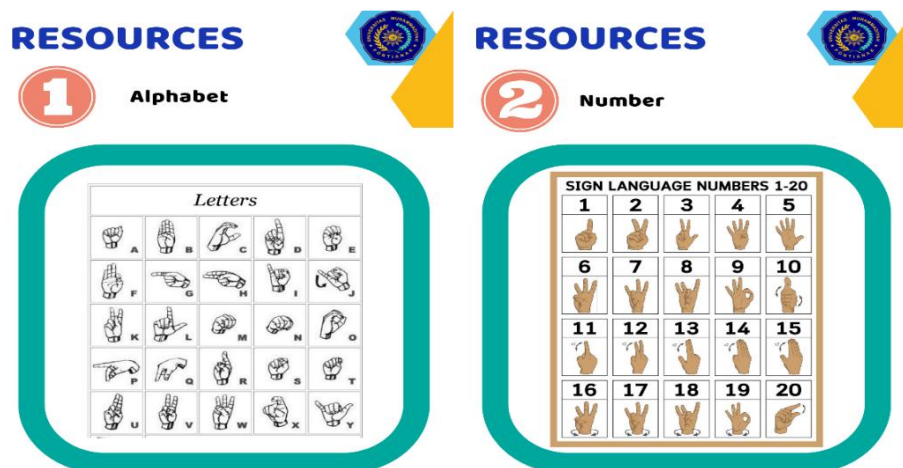


Figure 4. Alphabet and Number Sign Language

After the students are exposed to alphabet and numbers materials, they can learn basic sign language in American Sign Language. Sign language learning focuses not just on individual words but also on grammar, syntax, and sentence structure. Deaf kids can comprehend how to compose sentences and efficiently express meaning. Sign language requires both expressive (signing) and receptive (sign understanding) skills. Deaf students can use sign language to communicate with their peers and teachers, resulting in a dynamic and inclusive learning environment. This model incorporates visual aids, images, diagrams, and videos that can serve as highly effective tools for conveying information, ultimately enhancing students' comprehension and engagement. The combination of visual materials such as images with sign language assisted deaf students in learning vocabulary.

The designed material was also embedded with local cultural content. Incorporating local cultural elements into EFL sessions for deaf students not only improves language acquisition but also creates a sense of belonging and cultural awareness. It allows students to engage with the language on a deeper level while also recognizing the diversity and depth of their local culture. The materials designed are greetings with cultural symbols and icons. These are used to teach the students about the cultural symbols, icons, and landmarks of West Kalimantan Province. The use of icons of the province as visual aids can aid deaf students in understanding, recognising and correlating the information with their prior knowledge.

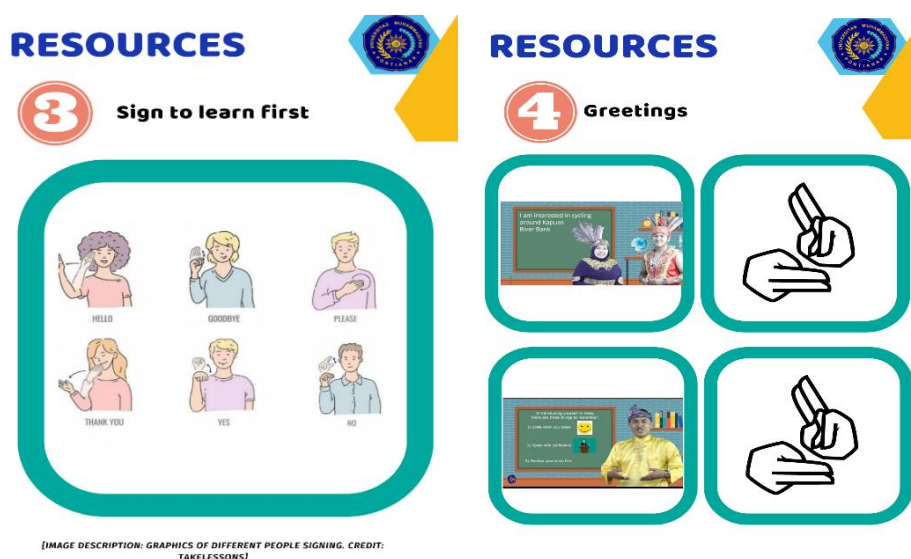


Figure 5. Sign Language and Video

## Discussion

This study underpinned the importance of local cultural integration in the teaching materials. When learning a sign language as a foreign language, it typically adheres to the established norms and standards applied to any foreign language learner. Using local content materials that are culturally relevant and incorporating sign language or other appropriate communication methods can be tremendously beneficial for deaf students learning English as a foreign language. It can bridge the gap between their existing sign language skills and the acquisition of English, making the learning process more effective and meaningful. It is important because deaf students have been perceived as having special needs education so a bilingual framework with historical aspects is worth including in the teaching materials (Higgins & Lieberman, 2016; Kožuh et al., 2016). Therefore, for the most efficient imparting of sign language skills, the instructional materials should incorporate connections to their corresponding cultural elements (Ackerman et al., 2018; Clark & Lee, 2018). The results of the content analysis proposed the integration of inclusive and accessible materials for deaf students. It is in line with a previous study that developed an interactive web learning model for deaf students to access online learning effectively (Astuti et al., 2023; Fitriyani et al., 2024). Several prior studies indicate that deaf students require assistive technology to aid them in the language acquisition process. Students with hearing impairments, such as the deaf, tend to learn visually, benefiting from multimodal elements that integrate practical verbal forms and visual semiotics in English language acquisition (Drajati et al., 2021; Ikasari et al., 2019). Deaf students should be facilitated by suitable teaching-learning materials designed with sign language to cope with communication barriers (Kermit, 2019; Tedla & Negassa, 2019). In Indonesia itself, English language instructors currently encounter difficulties in finding online-accessible foreign language learning resources. Hence, the development of assistive technology-driven learning media, particularly through sign language, is highly necessary (Chen, 2014; Jayanegara et al., 2020). The incorporation of American Sign Language into English language education in Indonesia remains pertinent.

The interview with a teacher experienced in teaching deaf students shed light on the intricate landscape of language learning for this student population. The insights gathered served as a foundation for designing tailored instructional materials, strategies, and technologies that cater to the unique needs and preferences of deaf students pursuing English language proficiency. Every deaf learner has different language development, literacy, and speech, and the model of assessment should be set to monitor the learners' progress (Brown & Byrnes, 2014; Paramansyah & Parojai, 2024). The integration of visual materials alongside sign language has proven to be a valuable aid in helping deaf students learn vocabulary effectively (Birinci & Saricoban, 2021; Drajati et al., 2021). Vision is regarded as a primary sensory channel for deaf learners, and educators should take into account their pronounced preference for visual learning to enhance visual skills, address attentional challenges, and emphasize the significance of visual content in the classroom (Ikasari et al., 2019; Rodrigues et al., 2022). Digital learning tools in multimedia elements offer deaf learners a variety of media formats that align with their learning styles and providing personalized, adaptive content delivery can significantly enhance the effectiveness of their learning experiences. This approach allows students to engage with educational materials not only in the classroom but also at home, catering to their unique needs and preferences. The interview results also justify the importance of culturally embedded materials as they enhance the depth and relevance of the learning experience for students (Ackerman et al., 2018; Clark & Lee, 2018). Being a deaf teacher and addressing the diverse needs of students in an inclusive educational setting can present significant challenges so that it necessitates the use of multisensory communication and fosters reciprocal interaction with learners and interpreters for collaboration (Hankebo, 2018; Jayanegara et al., 2020).

Deaf students have an equal right to receive education and accessibility to learn English, thus necessitating specific and supportive learning media aligned with their abilities (Chen, 2014; Yunisari et al., 2021). Deaf students from non-English-speaking countries undertake the study of English to facilitate communication in the realms of education, employment, and self-actualization. However, mastering the English language poses a challenge for them, making a tailored language-learning domain essential. Sign language serves as a crucial communication method for individuals with hearing or speech impairments, enabling swift and effective communication among those acquainted with it (Clark & Lee, 2018; Jenkins & Rashad, 2022). Within the context of learning English, American Sign Language (ASL) possesses a more universal essence in foreign language acquisition (Kožuh et al., 2016; Kusters, 2020). This characteristic significantly aids deaf students in learning English, given that ASL is widely accepted across numerous countries worldwide. Furthermore, the historical and ideological trajectory of sign language has led to the influence of American Sign Language adoption in Southeast Asia, such as Indonesia, as a consequence of national development and tourism (Higgins & Lieberman, 2016; Moriarty, 2020). This aligns with the exponential growth in the provision of English language learning materials using American Sign Language as a foreign language. Finally, the prototype model provides several advantages for fostering inclusiveness



in learning, particularly for students with disabilities, especially the deaf. The developed materials support culturally relevant learning, enhancing students' sense of identity. Learners acquire not just language skills but also culturally relevant knowledge, contributing to the enrichment of the metacognitive learning process. Additionally, it guarantees easy access and affordability as a user-friendly and easily operable web-based learning resource.

The results of this study make an important contribution to understanding the need for web-based sign language models for deaf students who use American Sign Language (ASL). This research shows that deaf students need wider and easier access to web-based learning models, which support their learning process through ASL. This model not only plays a role in providing more inclusive educational accessibility, but also serves as a tool to facilitate interactive communication and learning. Efforts to develop web-friendly learning models for deaf students are gaining traction, reflecting the importance of technology in inclusive education. The development of this web-based model can enrich our understanding of how technology can be integrated into learning for students with special needs. The study also emphasizes the importance of a more inclusive and technology-based approach to improving access to education for deaf students, which can ultimately support efforts to facilitate more interactive and adaptive learning. One of the limitations of this study is that socio-economic factors and access to technology may influence the adoption of this web-based model among deaf students. Challenges such as limited technological infrastructure or internet access in certain areas also need to be considered in the implementation of this model. Further research is recommended to explore how this model can be adapted to various social and geographical conditions and how collaboration between educational institutions and the technology community can expand the reach and effectiveness of this learning model. An interdisciplinary approach that combines technology, pedagogy, and educational inclusion studies will enrich the understanding of the future development of this web-based sign language model.

#### 4. CONCLUSION

The results of this analysis provide valuable insight into the strengths and areas for improvement in this textbook, ensuring that it meets the unique needs of deaf students learning English. Additionally, an interview conducted with an experienced teacher has shed light on individual learning needs, visual learning preferences, and the importance of sign language integration for deaf students. These insights have influenced the development of web-based sign language models that combine American Sign Language (ASL) with Indonesian local cultural content, thereby enhancing the language learning experience for deaf students. The web-based model prototype was designed to provide accessible, culturally relevant, and interactive materials for learning English with ASL.

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