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Digital Sign Language Applications: Enhancing Inclusive Communication for the Deaf Community

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Abstract: Advances in digital technology have brought about various sign language learning applications as innovative solutions to bridge communication barriers between the deaf community and the hearing community. This study aims to analyze the role of sign language learning applications in improving inclusive communication and to examine the perceptions of both groups regarding the use of this technology. This study uses a qualitative approach with an intrinsic case study method. The research subjects consist of six individuals, including three members of the Deaf community and three hearing users of the application in Malang City. Data collection techniques were conducted through in-depth interviews, while data analysis used the interactive model of Miles and Huberman. The results of the study indicate that digital applications facilitate initial access to sign language learning and play a role in reducing communication anxiety for the hearing community. However, the involvement of the Deaf community in the development of the application remains limited, thus failing to fully represent the needs and communication culture of the Deaf community.

Keywords: *sign language applications, inclusive communication, deaf community*

I. Introduction

Advances in digital communication technology have opened up new opportunities for building more inclusive interactions between people with disabilities and the general public (Dewantoro et al., 2023). One such innovation is the emergence of sign language learning apps that are accessible to anyone, anytime, via digital devices. These apps are designed to reduce communication barriers between the Deaf community and hearing individuals, particularly in social and educational contexts. In Indonesia, some of the apps that have been developed include Spetra, JakSL, Hear Me, Silang, iSign, and TULIterate (Nugraheni, Husain, & Unayah, 2021).

The sign language used by the Deaf community has a unique cultural meaning and is not merely a technical communication tool. BISINDO (Indonesian Sign Language) is a natural language used by the Deaf community in Indonesia, unlike SIBI (Indonesian Sign Language System), which tends to be oriented toward spoken Indonesian grammar (Gumelar, Hafiar, & Subekti, 2018). The use of SIBI in some applications is often seen as not representing the cultural identity of the Deaf community and can even lead to miscommunication. Therefore, the existence of these applications needs to be critically examined, particularly regarding cultural representation in their features.

Based on field findings in the deaf community in Malang City, it was found that sign language applications do facilitate initial access to learning for hearing people, but do not fully reflect the communication needs of the deaf community. Interviews with three Deaf users revealed that SIBI-based applications are perceived as not aligning with their natural communication style. On the other hand, three hearing users acknowledged that the applications help reduce awkwardness during interactions, but still feel their understanding of Deaf culture remains very limited. This situation highlights a disparity in perception between application developers, the Deaf user community, and the general public..

Previous research, such as that conducted by Putra & Suarsana (2024) highlights that the development of digital learning media for people with disabilities often does not actively involve the target group in its design. This aligns with Poerwanti, Makmun, & Dewantara (2024) who state that accessible technology must be designed from the outset using a participatory approach to ensure true inclusivity. Therefore, the involvement of the Deaf community in application development is not only an ethical choice but also a strategic aspect in ensuring equitable communication.

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Unfortunately, such involvement remains highly limited in application development practices in Indonesia to date.

Studies on the use of sign language learning applications are still relatively limited from an academic perspective, particularly those employing a participatory approach involving both the Deaf community and hearing society. Most previous research has focused on the technical development of applications or the evaluation of the effectiveness of specific features (Zikky, Akbar, & Utomo, 2019; Anugerah, Ulfa, & Husna, 2020). Few studies have examined the dynamics of using such applications in building inclusive communication based on an understanding of Deaf culture. Therefore, this research aims to fill this gap and contribute to the development of technology that is more sensitive to cultural diversity.

This study analyzes the role of sign language learning applications in building inclusive communication between the Deaf community and the hearing community, emphasizing the perceptions, usage, and limitations faced by both parties. Additionally, this study seeks to explore the extent to which these applications reflect the values and communication practices prevalent in the Deaf community. This study employs a qualitative approach using an intrinsic case study method in the city of Malang, involving six participants comprising three Deaf individuals and three hearing users of the applications. Data analysis was conducted using an interactive analysis model (Miles & Huberman, 1984).

A deep understanding of the use, perception, and development of sign language applications is expected to encourage the creation of functional, social, and culturally representative communication technologies. The results are expected to provide policy recommendations for application developers, educators, and policymakers to improve communication equality. This also underscores the importance of synergy between technological and cultural aspects in developing digital solutions for the disability community. Inclusive communication can be achieved through technological adaptation, as well as humanistic and participatory approaches in design and implementation (Wolfgruber, Stürmer, & Einwiller, 2022).

II. Method

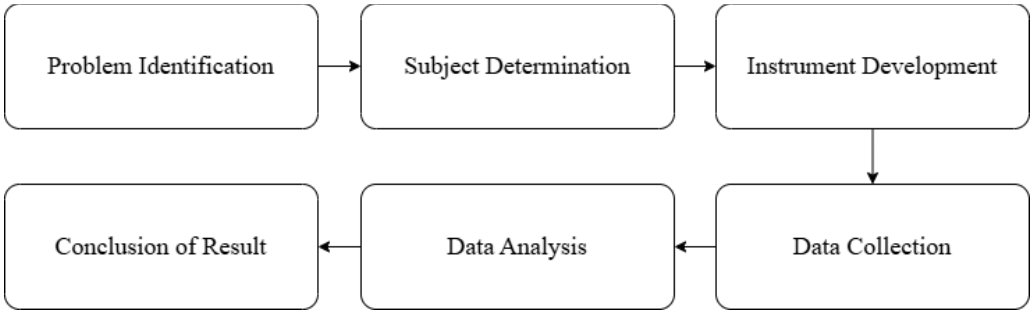
A qualitative approach using intrinsic case study methods was used in this study, as its main focus was to understand specific phenomena related to the use of sign language learning applications in building inclusive communication. Intrinsic case studies were chosen because the researchers wanted to explore unique cases in depth that were not intended to represent other cases, but were interesting because of their intrinsic value (Stake, 1995). This study seeks to understand the perceptions of the Deaf community and hearing users toward sign language applications in the context of Malang City. This location was chosen because it has an active Deaf community and access to several digital applications that are the subject of this research.

There were six subjects in this study, consisting of three members of the deaf community who work as sign language instructors and three app users from the hearing community. Subject selection was conducted using purposive sampling, which involves selecting participants based on their relevance to the research topic (Campbell, 2020). The primary research instrument was a guided in-depth interview guide developed based on indicators of perception, app usage experience, and views on inclusive communication. This instrument was developed based on a review of literature related to disability communication and inclusive communication technology.

Data was collected through face-to-face and online interviews, then analyzed using interactive data analysis techniques (Miles & Huberman, 1984), which consisted of data reduction, data display, and conclusion drawing or verification stages. Data validity was obtained through source triangulation techniques and member checks with participants. To clarify the research process, a research procedure chart was used, which included the following stages: problem identification, subject determination, instrument development,

data collection, data analysis, and interpretation of results. This research procedure chart aims to ensure that the research process can be understood systematically as shown in Figure 1.

Figure 1 Procedure Chart Research



III. Results and Discussion

Sign language applications introduced by several startups offer innovative features driven by the spirit of social inclusion. At their core, these sign language apps share a common primary feature: they serve as platforms for learning basic sign language, from the alphabet to everyday terms. Additionally, some applications provide functionalities to translate written text into sign language. Moreover, certain apps like HearMe and Silang even present opportunities for Sign Language Interpreters (SLIs) to secure employment through their platforms by serving as accessible interpreters for users. This SLI employment system is perceived as intriguing since, besides offering translation services, these interpreters also benefit financially from their expertise in translating sign language.

Sign language learning applications that are currently developing offer a variety of features to make it easier for the hearing community to understand deaf communication, from the alphabet to everyday terms. Informant T1, a deaf instructor, says: "The apps are great for hearing people, so they can tell a little bit, even if it's not all true. But if for those who need direct communication, yes, they still have to learn from Deaf people themselves." This statement is in line with the findings of Jacob et al. (2021) stating that application-based technologies are able to bridge the gap of early communication between disabled and non-disabled groups, yet interpersonal interaction remains a key element in building emotional closeness and understanding of cultural context.

On the other hand, members of the Deaf community have a different view regarding the existence of sign language learning applications. They believe that most applications still do not fully represent Deaf culture because they use SIBI, not BISINDO. One Deaf informant T2, "If the application uses SIBI, we feel uncomfortable because it is not the language we use every day. It's more like a translation of written text, different from natural Deaf sign language.". This aligns with the findings of Almos & Hidayat (2021) who noted that SIBI is considered too formal and does not reflect the natural communication of the Deaf community. Additionally, some Deaf informants also mentioned that the app's content is still dominated by the perspective of hearing society, so it has not yet incorporated the views of the Deaf community in its development process.

Most of the available applications use the BISINDO system, but there are still some that maintain SIBI. According to informant T2 "if you use BISINDO it's better, because it's our language. If SIBI kan kayak made by people hear, we hardly wear." This confirms the findings of Nugraheni et al. (2023) which highlights the incongruity of SIBI usage among the Deaf community because its structural logic follows the Indonesian spoken language, in contrast to BISINDO which developed naturally in the daily interactions of the Deaf community in Indonesia.

The lack of involvement of the Deaf community in the development of a number of applications is a separate problem. Informant T3 revealed, “often the application was made people listen without asking first to us, eventually many cues are wrong or different meanings in our area". Tsatsou (2020) in his study explained that one of the basic principles of the development of ethical disabled technology is the active participation of target groups so that the products produced truly represent the needs and culture of the community. When this is ignored, the app is vulnerable to generating cultural and linguistic biases.

Application users from the hearing community are mostly familiar with sign language not from the application, but through direct friendship with the Deaf. Informant D1 said, "I first knew sign language because a deaf friend in college, only after that looking for an application to learn.” This condition is in accordance with the results of research by Kaur & Saukko (2022) which show that the success of inclusive communication is determined more by direct interpersonal relationships than dependence on digital media, although applications still play a complementary role.

Difficulty understanding the logic of sign language is a challenge for the hearing community. Informant D2 said “Early Learning was difficult because the logic of sign language is very different from Indonesian. Moreover, SIBI is more like translated word for word, while BISINDO is more natural.” This is supported by the study of Yusuf & Tajibu (2021) which explains that BISINDO developed as the natural visual-gestural language of the Indonesian deaf community, while SIBI is a formal construct that is not fully culturally accepted by the Deaf community.

The use of applications among the hearing community is more often used to increase vocabulary or recognize cues from other areas. Informant D3 convey, “If I use the application just to find signals that do not know, for example, the same signal in Jakarta in Malang different". The study of Bitman (2022) supports this phenomenon with the finding that digital platforms act as a referential means, rather than the main learning medium in the context of communication with disabilities, because direct experience is still more effective in conveying emotional and cultural meaning.

The lack of inclusion of Deaf culture in application development is a concern. Informant T1 reiterated, “The creators of the application should have asked the Deaf first, because Sign Language is a culture, not just hand gestures". Patrick & Hollenbeck (2021) in their research also stated that without the cultural representation of disabled users in the digital design process, digital products will tend to be homogeneous and fail to answer the diversity of the actual needs of the disabled community.

The uneven distribution pattern of digital applications is also an obstacle. Informant T2 mentioned, “The applications are mostly famous in the big city, in the area rarely anyone knows. But in the villages there are also many deaf friends who need it”. According to Scanlan (2022), the digital divide is still a challenge in providing accessible technology for disabled communities in suburban areas, so the spread of technology must be accompanied by an information equalization strategy.

Sign language applications are recognized as contributing to inclusive communication, but their use cannot completely replace direct interaction. Informant T3 stated, “The application is just a tool, not a substitute for direct learning. If you just rely on the app, you will not be able to understand Deaf culture”. Mansutti et al. (2023) asserted that the success of communication between deaf and hearing communities is more influenced by the quality of social contacts than the use of digital communication media, because Sign Language is full of social values and emotions that cannot be fully translated by machines.

Among the hearing community, the app also helps lower communication anxiety when first interacting with the Deaf. Informant D2 revealed “If there is an application, at least I am not too afraid to be wrong when talking to deaf friends". Ahlin & Hiddinga (2023) in their research stated that the presence of visual communication aids can reduce the level of communication apprehension, although the long-term impact remains dependent on consistent interpersonal interaction.

Sign language app development initiatives involving the Deaf community were recognized by informants as the most appropriate measure to ensure cultural accuracy and acceptability of apps among the Deaf. Informant D1 argues, “If deafness is involved, the results would be more suitable. For example, there are different signals in each region, well that can be accommodated.” These findings are in line with Radanliev et al. (2024) view that good design of disabled services should prioritize the full participation of disabled users as the main subject of development. When the target group determines the materials, methods, and features, the resulting products tend to be more relevant, inclusive, and adaptive to local diversity.

Most hearing people use the app as an initial aid to minimize the awkwardness of interacting with the Deaf community, rather than as a primary means of becoming proficient in sign language. Informant D3 stated “Now that more and more people are aware of the importance of learning cues, applications can help, but still have to meet directly with the deaf to really understand”. Such statements reinforced the results of the study Sari & Altiarika. (2023) which shows that sign language-based applications do play a role in lowering the initial barriers to communication, but the confidence of new users is maximally formed through a continuous process of direct contact with the Deaf community.

Efforts to increase difabel awareness in the wider community through digital media, including Sign Language applications, are important in shaping inclusive communication literacy. T2 informants argued “If people hear more often see applications or cue content on social media, over time they also understand more about deaf friends". This view is in line with the findings of Pettersson (2023) which states that digital-based disability literacy campaigns are effective in suppressing negative prejudices, forming a more equitable social understanding, and expanding the reach of education about difability in the general public.

IV. Conclusion and Suggestion

The findings obtained show that sign language learning applications have a positive contribution in expanding communication access between the Deaf community and the hearing community. The application is considered capable of being a supporting medium in introducing the basics of sign language and facilitating the hearing community to understand simple gestures. Nonetheless, the process of learning sign language cannot be completely substituted through application because the cultural nuances and emotional meanings contained in Deaf communication can only be fully understood through direct interaction. The involvement of the Deaf community in the development of application content is an important factor so that the representation of local culture and diversity in sign language is maintained.

The main recommendation in the development of sign language applications in the future needs to place the Deaf community as an active subject, both in Material Design and feature evaluation. Equitable distribution of applications to various regions, especially suburban areas, should be a priority so that the benefits can be felt evenly. This effort is expected to reduce communication anxiety among the hearing community and strengthen social relations between deaf and non-deaf groups in various social interaction spaces.

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