

Developing Digital Teaching Media for Indonesian Sign Language (BISINDO)Nabillah R^{1*}, Hari Setiaji²19523149@students.uii.ac.id^{1*}

Abstract: *This research raises questions about learning Indonesian Sign Language (BISINDO), which still needs more resources to help people learn it outside of a single sign class. Since it makes people who learn it quickly forget the material, there needs to be more material to be studied repeatedly. Hence, a website-based sign language learning media application was developed with the Join Application Design (JAD) research method to overcome these problems. With the JAD method, stakeholders were observed and interviewed, and a team was assembled to design the application. This research focused on the application's feasibility by testing it through usability testing. The indicators in ISO 9421-11 were used to test how well the developed application worked regarding convenience, efficiency, and satisfaction. The test results revealed an average value of 60–70% with a good category, so this Indonesian Sign Language digital teaching aid can be utilized. However, it can still be developed to be better.*

Keywords: *BISINDO, Digital Teaching, Deaf, Joint Application Design (JAD), Usability Testing*

Abstrak: *Penelitian ini mengangkat permasalahan terkait pembelajaran Bahasa Isyarat Indonesia (BISINDO) yang masih membutuhkan lebih banyak materi untuk mendukung pelaksanaan pembelajaran selain di kelas isyarat tertentu. Hal tersebut membuat orang yang mempelajarinya cepat lupa dengan materi tersebut karena perlu adanya materi yang lebih banyak untuk dipelajari secara berulang-ulang. Aplikasi media pembelajaran bahasa isyarat berbasis website dikembangkan dengan metode penelitian Join Application Design (JAD) yang digunakan untuk mengatasi permasalahan tersebut. Metode JAD dilakukan dengan melakukan observasi dan wawancara kepada stakeholder dan membentuk tim untuk mengembangkan desain aplikasi. Penelitian ini akan berfokus pada kelayakan aplikasi dengan menguji aplikasi menggunakan Usability Testing. Aspek yang diuji adalah kemudahan, efisiensi, dan kepuasan dengan menggunakan indikator pada ISO 9421-11, yang digunakan untuk menguji kelayakan perangkat yang dikembangkan. Hasil pengujian memperoleh nilai rata-rata 60-70% dengan kategori baik, sehingga alat peraga digital Bahasa Isyarat Indonesia ini dapat digunakan. Namun, juga masih dapat dikembangkan menjadi lebih baik.*

Kata Kunci: *BISINDO, Alat Ajar Digital, Tuli, Joint Application Design (JAD), Usability Testing*

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INTRODUCTION

Language is a medium used to communicate with others in everyday life to maintain social relationships in the surrounding environment (Supiandi, Tanu Kusnadi, & Riniawati, 2020). Specifically, sign language is one of the many languages that exist and is one of the communication media used by deaf people to communicate with ordinary people or fellow deaf people. Deaf people are those with limitations in their sense of hearing. Even so, they prefer to be called "Tuli" or, more familiarly, "Teman Tuli," which shows the identity of deaf people as people with their language and culture, not a disability or deficiency that must be corrected. Meanwhile, people who are not disabled are addressed as "Teman Dengar" (Sutrisnadipraja et al., 2019). Like languages in general, with diversity in each country, sign language also has different varieties. Sign language in Indonesia has two varieties: the Indonesian Sign Language System (SIBI) and Indonesian Sign Language (BISINDO).

The Indonesian Sign Language System (SIBI) is a sign developed with standards normalized with Indonesian grammar. SIBI itself is an adaptation of American Sign Language, which uses only one hand in its application (Nasir, Sudaryanto, Kusumaningrum, Komunikasi, & Surabaya, 2021). Many people argue that SIBI is categorized as more challenging to learn because it contains standardized and complicated vocabulary and has prefixes and suffixes. In contrast to SIBI, Indonesian Sign Language (BISINDO) was formed by the "Gerakan untuk Kesejahteraan Tunarungu Indonesia" (Gumelar, Hafiar, & Subekti, 2018). BISINDO has different variations in each region in Indonesia. BISINDO is also a natural language that emerged and developed by deaf people following the characteristics of the region and is considered a sign language that can better represent deaf culture in Indonesia since it is influenced by the interaction of values from each region (Wijaya, 2018). It makes BISINDO have a variety of "dialects" from various regions and often changes from time to time. BISINDO is also delivered with familiar two-handed gestures and facial expressions that the informants consider very suitable for their strong ability in visualization (gumelar). It can improve communication skills, enhance relationships, make the brain more active, and develop and balance the working power of the left and right brain (Aisyah Muhammad Amin & Pribadi, 2022).

For beginners who will learn sign language, it is recommended to follow the flow from beginner to advanced level through sign language classes. In this case, the Special School Part B, Yayasan Pendidikan Anak Cacat (SLB B YPAC) Palembang, is one of the schools for people with disabilities with hearing impairments. In daily teaching and learning activities, students still often experience problems remembering the material taught, both in introducing letters and numbers. The barrier to student learning is that learning must be done not only once so that they can remember and understand what is being taught (Huda, Adha, & Saputri, 2018). However, sign language classes will only be conducted temporarily or over time. Afterward, deaf people will continue learning independently, relying on limited, difficult-to-understand teaching materials. For this reason, sign language learning needs to be expanded so students can learn BISINDO independently and not depend only on the class.

To overcome these problems, an alternative is required to support sign language learning. In this regard, one can use a learning media application containing sign language material for beginner-level learning media applications to be developed based on the website. The development of this website-based learning media application is expected to help sign language learning independently. The purpose of developing this application of sign language learning media is also to assist the role of the teacher/instructor in teaching sign language. Nevertheless, this application is appropriately used as a supporting tool for the sign language teaching and learning process. The initial introduction would be the first step in independently learning the BISINDO communication language (Hendra Pradikja, Tolle,

& Brata, 2018). With this web-based learning, it is expected to help anyone who wants to learn Indonesian Sign Language increases his confidence in communication and preserve using BISINDO as a communication medium in Indonesia.

In comparison, in previous research, researchers developed a website-based sign language learning media application that introduces letters and numbers in sign language in animated images (Huda et al., 2018). Meanwhile, the material displayed in the current application would be in the form of a photo played directly by one of the deaf people with a smaller file size so that it does not reduce the file size. In addition, the photo format was chosen because this format has a small file size and is easy to remember.

RESEARCH METHODS

The research method in this study used Research and Development (RnD) with Joint Application Design (JAD) as development models. This stage contained a process or a flow carried out in an organized, structured, standardized, logical, and systematic manner.

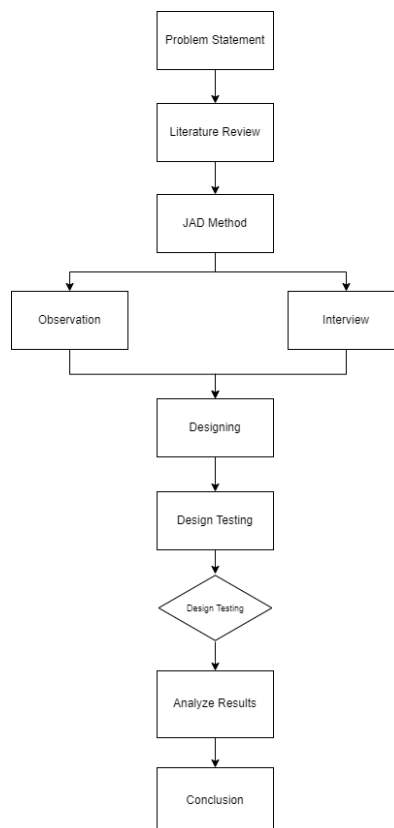


Figure 1. Research Method

As mentioned, this research applied the Joint Application Design (JAD) method, producing valid, effective, and practical BISINDO teaching tools. The JAD method was also applied to identify the system's needs based on users. The system was then tested using a usability questionnaire measuring user convenience, efficiency, and satisfaction.

Joint Application Design (JAD)

Joint Application Design (JAD) is a stage that focuses on the stakeholders' involvement and commitment to determine the system's needs and design (Aldisa, Alfarisi, & Furqon, 2022). The JAD method was carried out by forming a team of developers and stakeholders fully related to the authors' research topic. This method was realized as a live or virtual discussion forum.



Figure 2. Joint Application Design Method Implementation

The picture above is a documentation of the implementation of the JAD method conducted directly with one of the 'Deaf Friends' who is a member of an Indonesian Sign Language organization in the Yogyakarta Special Region. The authors also conducted an interview at the meeting regarding the material and system design.

Usability Testing

Usability testing was performed to evaluate whether the user interface design developed is in accordance with user needs. Usability testing was also carried out by considering three aspects, namely convenience, efficiency, and satisfaction, with ten questions asked, including criticism and suggestions needed by the authors to assist in developing the user interface design for the better. The authors then conducted the test through a google form distributed to related users who were directly involved in teaching BISINDO.

Table 1. Draft of Usability Scale Questions

Aspect	Question
Convenience	Is the interface of the application easy to recognize?
	Is the application easy to operate?
	Are the icon symbols and images easy to understand?
Efficiency	Is the material in the application easy to access?
	Is the text easy to read?
	Does the application offer functions in accordance with its purpose?
Satisfaction	Do the features in the application make it easy for you to run it?
	Are you satisfied with the information provided in the application?
	Are you satisfied with the display of the application?

interface?

Are you generally satisfied with this application?

During the test, the respondent performed a task: running the user interface design through the application link in the questionnaire. After completing the task, respondents answered ten questions representing three usability categories. Respondents filled them in based on their experience and what they saw after completing the task. Then, the respondents filled out a questionnaire to get a usability value for the application. The questionnaire given had ten questions with choices using a scale. The five scale answer options are as follows.

Table 2. Answer Scale Range

Score	Answer Choices
5	Very good
4	Good
3	Enough
2	Not good
1	Bad

The Joint Application Design (JAD) method is implemented by conducting joint discussions with relevant sources. In this research, the authors discussed with a member who was also a teacher in an Indonesian Sign Language organization in Yogyakarta Special Region. His full name is Guruh Hizbullah Alim, usually called Alim. He is 27 years old and comes from Sleman, Yogyakarta. As a 'Deaf Friend,' Alim has applied to BISINDO since 2014. He studied the Indonesian Sign Language System (SIBI) first. During his education, he recognized the existence of natural sign language developed based on the habits and culture of many different regions. It made him start studying BISINDO and do much research until now, finally joining the BISINDO organization in Yogyakarta Special Region.

According to Alim, BISINDO was formed through habits from everyday people. It is what makes BISINDO from each region different in its application. However, the differences in BISINDO gestures do not cause difficulties communicating using these signs. He said that the different gestures will still be easily understood because the gestures and words used are based on natural sign language, and using both hands also clarifies the meaning and intent of the conversation.

During the interview, Alim mentioned a BISINDO teaching method, the Common European Framework of Reference for Languages (CEFR), which is a framework of reference in language teaching, including a series of learning, teaching, and assessment of the language being studied, in which the material provided has been adapted to the context in Asia (Widodo, 2018). CEFR also implements evaluation and review to be carried out in every lesson. The organization, followed by Alim, called Pusbisindo, provides BISINDO teaching services from level 1 to level 3. For level 4 itself, Alim stated that it is still in the research stage related to the words and gestures to be taught. Level 1 starts with introducing the alphabet, basic words, and numbers. Level 2 will apply a method without spelling

the alphabet one by one, but all learning only uses gestures, and participants can write if something is not understood. Meanwhile, level 3 will again use the alphabet, spelling, and gestures.

In teaching at these three levels, most material used visualization of images and some videos and direct application supervised by 'Deaf Friends.; Apart from the previous learning method, BISINDO can also be learned independently by searching for online materials. Alim advised practicing directly with 'Deaf Friends' so that vocabulary and gestures can develop independently. This method is usually employed to learn a new language.

RESULTS AND DISCUSSION

The system was designed as an easy-to-understand website for users. Developing the BISINDO System in Yogyakarta Special Region aims to help as teaching material for BISINDO in Yogyakarta Special Region at a basic level, containing alphabets, numbers, and third-person pronouns. From the system model description designed together with stakeholders through a series of previous interviews, the authors made a usecase diagram to describe the relationship and flow of the system to be developed.

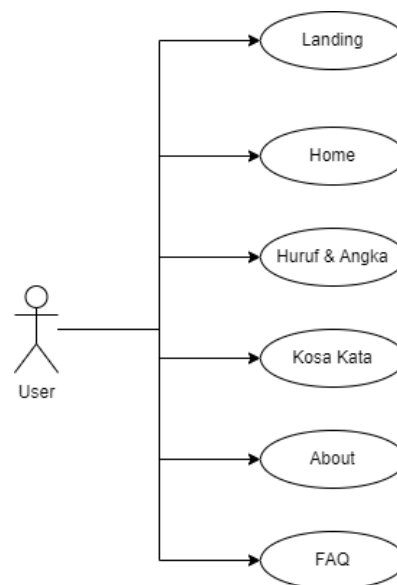


Figure 3. Usecase Diagram

Users would access the website page, greeted with a landing page. By pressing the get started button, they would be directed to the homepage. Apart from the get started button, users can also go to other application pages through the navigation bar buttons.

User Interface

The application to be developed consists of seven pages whose design was carried out with stakeholders.

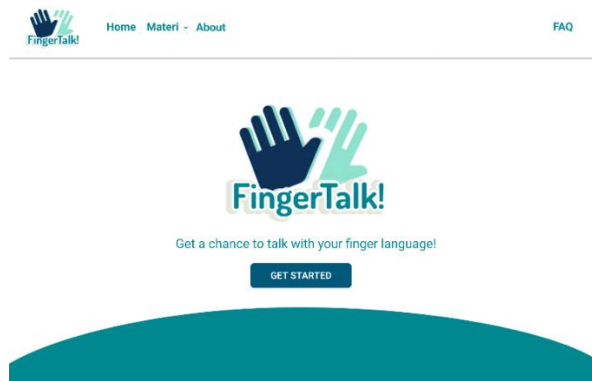


Figure 4. Landing Page

The landing page was designed to be as simple as possible as the page to appear first when the application is accessed. This page will greet users every time they use the application. The landing page also contains a logo, a navigation bar, and a button to start the application that will be directed to the main page or dashboard. Next, the home page has a history and summary of the benefits of learning BISINDO with a simple but attractive display.



Figure 5. Homepage

The letters & numbers page contains material related to letters and numbers, which this page has buttons according to the number of alphabets and numbers. The material on this page was developed interactively. Users can click the button according to the desired alphabet or number, and the gesture will appear in the box next to the button as an image.

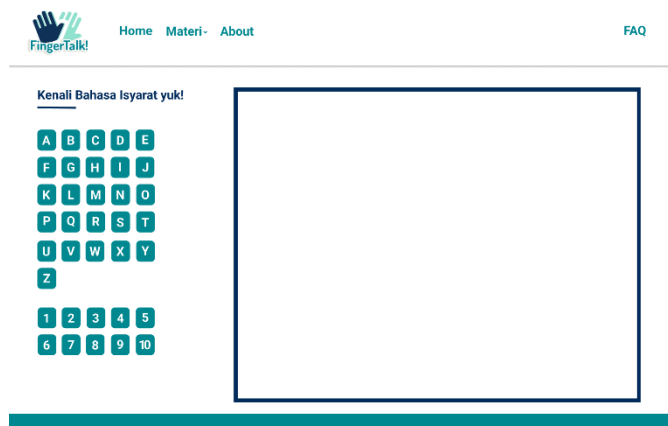


Figure 6. Letters and Numbers Page

The pronouns page has the same function as the letters & numbers page, an interactive page for learning BISINDO. Unlike the previous page, which contains letter and number material, this page contains material related to personal pronouns.

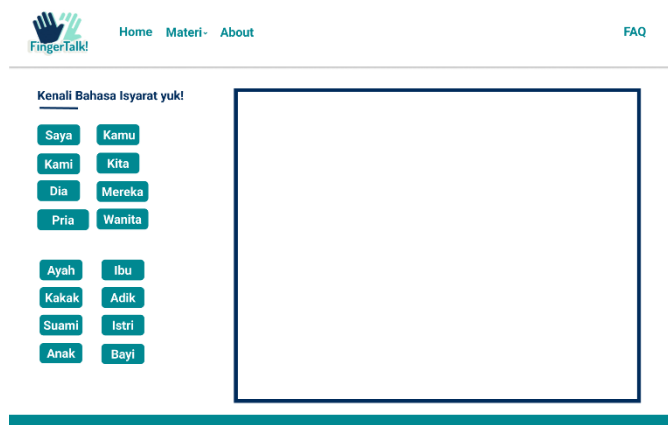


Figure 7. Pronouns Page

The FAQ page is a page containing frequently asked questions about BISINDO or the world of 'Deaf Friends,' along with answers obtained from trusted sources.

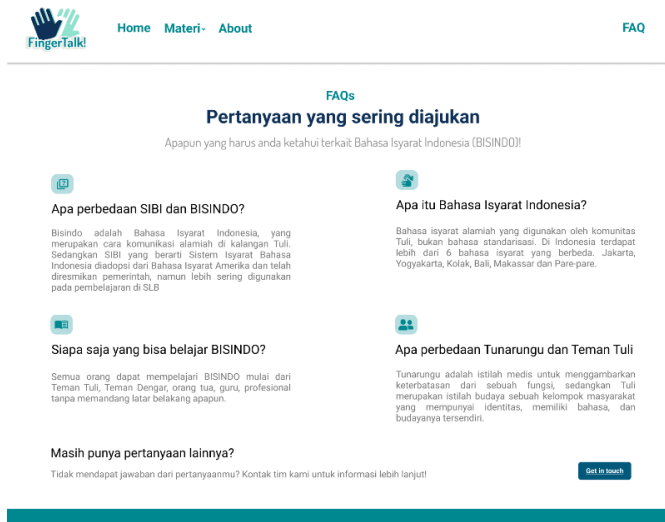


Figure 8. FAQ Page

The about page contains brief information related to the application focus and scope, motivation as an encouragement to learn Indonesian Sign Language (BISINDO), and information related to the digital teaching tool developer.

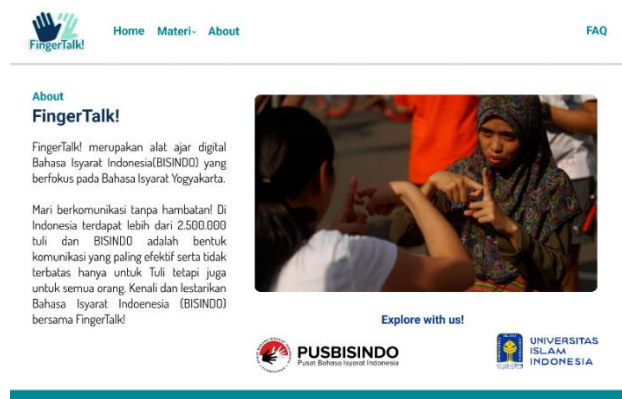


Figure 9. About Page

Usability Testing

Data from the test results were processed based on the questions' categories. The categories included convenience, efficiency, and satisfaction with the design. According to ISO 9421-11, there are three components as usability standards: convenience, efficiency, and satisfaction according to the scope of its users. Jacob Nielsen defines the quality of user experience as measured when the user interacts with web products or systems, software applications, or other designs (Majiddan Nur et al., 2022). More complete test results are explained in detail below. Table 4 below presents answers from respondents to the system usability scale questions:

Table 3. Results of Respondents' Answers to the Questionnaire

Respondent	Question									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
R1	5	2	5	4	5	4	1	5	4	4
R2	1	1	3	4	5	4	3	3	3	3
R3	4	3	4	4	3	4	4	3	4	3
R4	5	5	5	5	5	5	5	5	5	5
R5	5	4	4	5	5	5	4	4	4	4

Table 4. Usability Scale Final Results

Respondent	Question										Total	Score
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
R1	4	3	4	3	0	3	4	4	1	3	29	72.5
R2	0	4	2	3	0	3	2	2	2	2	20	50
R3	3	2	3	3	0	3	1	2	1	2	20	50
R4	4	0	4	4	0	4	0	4	0	4	24	60
R5	4	1	3	4	0	4	1	3	1	3	24	60

Based on the results of these measurements, the value of the test results and usability testing was then discussed according to their categories: convenience, efficiency, and satisfaction. In addition, material testing was conducted by calculating all tasks successfully done by the user and calculating the satisfaction criteria using a questionnaire. Using a System Usability Scale (SUS) questionnaire, a Likert scale was employed with several points 1-5 and its calculation method (Hartawan, 2019).

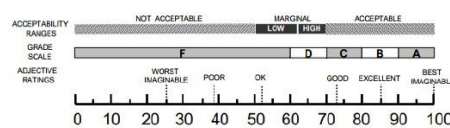


Figure 10. Scoring Matrix

According to the usability testing interval calculation, the value obtained was in the good category assessment range (Majiddan Nur et al., 2022). However, the authors planned to attempt to improve the user interface and increase the percentage of user satisfaction.

CONCLUSIONS AND RECOMMENDATIONS

Based on the research that has been carried out, the development of the Indonesian Sign Language Digital Teaching Tool (BISINDO) website can be used as an introductory level. Sign language learning material introduces the history, benefits, letters, numbers, and personal pronouns interactively. The design of the Indonesian Sign Language Digital Teaching Tool (BISINDO) has been

successfully made using the Joint Application Design (JAD) method as a research method and usability testing as a testing method. The aspects tested were convenience, efficiency, and satisfaction, following indicators in ISO 9421-11. The testing results obtained an average value of 60-70% with a good category, but it can still be developed to improve. This digital teaching tool was also successfully designed and developed together with stakeholders and in accordance with requests from users who wanted a system to assist in teaching Indonesian Sign Language (BISINDO) that many people can reach. Testing the system design resulted in an average score in the good category for each category of convenience, efficiency, and satisfaction. With this BISINDO Digital Teaching Tool, it is anticipated that it can help everyone who wants to learn or teach BISINDO and help preserve the use of BISINDO in Indonesia.

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