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Analysis of BISINDO Sign Language Implementation in Simple Sentences Based on 3D Animation

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Abstract

The deaf are described as individuals with hearing impairments ranging from mild to severe who rely on visual-based communication. In Indonesia, Indonesian Sign Language (BISINDO) is widely used due to its natural development within the deaf community. This study aims to evaluate the development and implementation of 3D animation as a visual learning aid for simple BISINDO sentences, making learning more intuitive and accessible. Using the ADDIE instructional model (Analysis, Design, Development, Implementation, Evaluation), the research integrated 30 sign language words into 17 simple sentences featuring custom 3D characters. Descriptive qualitative analysis combined with Likert-scale questionnaires evaluated media validity and usability through feedback from material experts, media experts, and a field test with 6 deaf students from Universitas Negeri Malang. The validation results yielded an overall score of 86.25%, categorizing the 3D animation media as "Very Suitable" for educational use. The findings confirm that 3D animation effectively bridges communication gaps by presenting realistic motion and engaging visual content.

Keywords: D Animation; BISINDO; Hearing Impairment Children

1. Introduction

Deaf individuals are people who experience varying degrees of hearing impairment and require specific communication methods in their daily lives (Hidayati & Franesya, 2024). Communication is key to a person's success in achieving life goals. One primary form of communication used is sign language (Munarsih, 2010). In Indonesia, Indonesian Sign Language (BISINDO) is more widely used in daily interaction as it formed naturally within the deaf community (Rahmah, 2018). However, a communication gap still exists between deaf individuals and the general public due to low public awareness of sign language and a lack of interactive learning media.

Learning for deaf individuals relies heavily on visual strength (Marschark & Spencer, 2011). With technological advancements, multimedia-based learning media can enhance understanding effectiveness through a combination of visual and cognitive elements (Mayer, 2009). One potential form of multimedia is 3D animation, which can display realistic and dynamic movements to visualize sign language (Azuma, 1997). This article aims to analyze the implementation of 3D animation-based BISINDO in simple sentences, test media effectiveness, and identify its strengths and limitations in supporting inclusive learning.

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2. Method

This study utilizes a qualitative descriptive approach combined with the ADDIE instructional development model to design and evaluate the 3D animation learning media.

2.1. Analysis

Needs identification was conducted through interviews with sign language interpreter experts and literature studies regarding communication barriers among deaf individuals

2.2. Design

The pre-production phase included scriptwriting for 17 simple sentences (consisting of 30 sign words), character modeling (*modelling* Mira, Otan, and Otin), texture applying (*shading*), and character rigging (*rigging*).

2.3. Development

The production process involved layout arrangement, character movement adjustment based on BISINDO sign references, rendering, and final editing. Validation instruments were also developed during this stage.

2.4. Implementation & Evaluation

The media was validated by material experts, media experts, and subjected to a limited trial with 6 deaf students in the GEMPITA Student Activity Unit at Universitas Negeri Malang. Data was collected using Likert-scale questionnaires (scores 1–4 for experts and 1–5 for users). Percentage data was calculated using the ratio formula:

$$R = \frac{?}{?} \times 100\%$$

Note: R= Percentage value, S= Total score collected, N= Total expected score. Percentages were classified into "Very Suitable" (81%–100%) and "Suitable" (61%–80%) categories (Jannah et al., 2019)

3. Results and Discussion

3.1 Result

The implementation of BISINDO was realized in 3D visualizations covering 30 sign words arranged into 17 simple sentences. The design process resulted in three main characters (Mira, Otan, and Otin) used to demonstrate the sign movements.

Table 1. Media Feasibility Evaluation Results

NO	Evaluator / Test Subjects	Validity Percentage	Feasibility Category
1	**Material Experts & Media Experts**	**85.00%**	**Very Suitable**
2	**Limited Field Trial (6 Deaf Students)**	**87.50%**	**Very Suitable**
Overall average	**86.25%**	**Very Suitable**	

3.2 Discussion

The development of 3D animation was proven effective in visualizing BISINDO sign language movements. Based on the combined validation result of 86.25% (Table 1), this media falls under the "Very Suitable" category. The primary advantage of this 3D animation media lies in its accurate three-dimensional visualization of hand gestures and facial expressions, making it easier for deaf users to intuitively understand simple sentence structures. This aligns with multimedia cognitive processing theory, which states that combining dynamic visual elements reinforces information retention (Mayer, 2009).

However, this study has several limitations. The developed material scope remains limited to 17 simple everyday sentences, and field testing was conducted with a limited sample size (6 students). Future development is recommended to expand vocabulary coverage and involve a broader sample size across primary school levels.

4. Conclusion

The application of 3D animation-based Indonesian Sign Language (BISINDO) successfully visualized 30 sign words into 17 simple sentences through interactive animated characters. Expert validation and user trial results yielded a score of 86.25%, demonstrating that this media is highly suitable and effective for use as a sign language learning aid for deaf individuals and instructors.

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