Joyful Learning-Based Interactive Media to Improve Neurolinguistic Activity in Language Learning in Elementary School

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Abstract. This study aims to analyze the effectiveness of interactive media based on joyful learning in improving students' neurolinguistic activity in language learning in elementary schools. The study used a mixed methods approach with a non-random quasi-experimental pretest-posttest group control design. The study sample consisted of 36 5th grade elementary school students who were selected purposively. The results of the analysis showed a significant increase in student learning outcomes with an average pretest score of 76.689 and a posttest of 82.683. Students' neurolinguistic activities, such as vocabulary processing and sentence structure, showed an increase supported by observations of verbal and non-verbal responses. Students' responses to learning were also positive, with 92% feeling more motivated and 85% considering learning more enjoyable. This study emphasizes the importance of integrating interactive media and joyful learning to create meaningful learning, increase student motivation, and stimulate neurolinguistic activity. Implementation constraints include limited technology and preparation time, which can be overcome with strategic solutions such as teacher training and the use of offline-based media. Further research is needed to explore the impact of this method on other language skills.

Keywords: Joyful Learning, Neurolinguistik, Language Learning, Interactive Media, Elementary School

1 Introduction

The importance of interactive media in language learning is increasingly recognized as one of the innovations that can increase student motivation and learning outcomes [1]. Interactive media provides various visual, audio, and animation features that are able to attract students' attention, making learning more interesting and effective [2]. In addition, this medium allows students to learn independently with greater control over their learning process, which contributes to the development of cognitive and metacognitive skills [3]. However, optimal implementation of interactive media requires integration with relevant pedagogical approaches to achieve more significant learning outcomes [4].

Joyful learning has been proven to be a learning approach that is able to create a fun and meaningful learning experience for students [5]. This approach emphasizes positive emotional engagement, which contributes to the formation of a conducive learning atmosphere [6]. When students feel comfortable and motivated, the learning process becomes more effective, so learning outcomes can be significantly improved [7]. In the context of language learning, joyful

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learning can be applied through the use of interactive media that incorporate elements of play, challenge, and instant feedback to encourage student engagement [8].

Neurolinguistic activity is an important element in language learning, because it involves complex brain processes in understanding, producing, and analyzing language [9], [10]. Research shows that rich experiential learning can stimulate various brain areas associated with linguistic ability, such as Broca's and Wernicke's areas [11]. This activity not only supports the development of language skills, but also facilitates the connection between the cognitive and emotional components that play a role in learning [12], [13]. Therefore, learning that integrates neurolinguistic activities and interactive media can accelerate students' language mastery [14].

Despite the great potential of interactive media and joyful learning, gaps remain in the implementation of both to support students' neurolinguistic development. Most previous studies have focused more on the effectiveness of interactive media in general without considering its integration with a neurolinguistic-based joyful learning approach [15], [16], [17]. This points to the need for more in-depth research to explore how collaboration between interactive media, joyful learning, and neurolinguistic activities can improve overall language learning. This research aims to; Analyze the effectiveness of Joyful Learning-based interactive media in improving students' neurolinguistic activities, identify effective learning activities using joyful learning-based interactive media, and examine the challenges of applying interactive media in language learning.

2 Research Method

This study uses a mixed approach (*mixed methods*) with exploratory design to deeply explore the influence of interactive media based on *joyful learning* on neurolinguistic activities and language learning of students. This approach was chosen because it is able to provide a quantitative picture of student learning outcomes as well as qualitatively analyze the learning experiences experienced by students and teachers [18]. This research was carried out in the odd semester of the 2024/2025 school year, precisely in November, so it is relevant to see the initial implementation of the designed learning method.

The population in this study is all 5th grade students at SDN Kutosari. The research sample consisted of 36 students selected through the *purposive sampling* based on certain criteria, such as willingness to participate in research and active involvement in the learning process [19]. Design This study uses a quasi-experimental method with design *pretest-posttes group* control not randomly (*Pretest-Posttes Non Equivalent Control Group Design*This approach aims to compare the effectiveness of the use of interactive media based on *joyful learning* in improving students' language learning outcomes and neurolinguistic activities.

The instruments used in this study include tests, observations, and questionnaires. Tests are used to measure students' language learning outcomes before and after the intervention, which serves as the primary quantitative data [20]. Non-participant observations were made to record students' neurolinguistic activities, such as verbal and non-verbal responses during learning [21]. Meanwhile, questionnaires are used to evaluate students' experiences related to the implementation of *joyful learning*, which helps to understand the emotional impact of the interventions given.

The data collection technique is carried out systematically. Pretest and posttest were given to measure changes in student learning outcomes after the intervention. Non-participant

observation is carried out during the learning process to observe student activities directly. In addition, semi-structured interviews with students and teachers were conducted to explore more deeply their experiences while using interactive media [22]

The collected data was analyzed using quantitative and qualitative techniques. Quantitative analysis was performed with a t-test to compare pretest and posttest scores between the experimental and control groups, aiming to identify significant differences in learning outcomes [23]. Qualitative data from observations and interviews were analyzed narratively to find key themes related to students' neurolinguistic activities and learning experiences. This combination of analyses provides a more complete picture of the effectiveness of interactive media based on *joyful learning* in improving language learning.

3 Result and Analysis

The results of the analysis of *Paired Samples T-Test* showed that there was a significant difference between the pretest and posttest scores with the value of $t(35)=-12.291$, $p<0.001$. The following are the results of the analysis using the JASP 0.17.1.0 application:

Table 1. Paired Sample T-Test Results

Paired Samples T-Test

Measure 1		Measure 2	t	df	p
PRETEST	-	POSTEST	-12.291	35	<.001

Note. Student's t-test.

The normality test using the Shapiro-Wilk method produced values of $W=0.941$ and $p=0.056$, which indicates that the data is normally distributed. The following is a table of normality test results:

Table 2. Tes of Normality Result

Test of Normality (Shapiro-Wilk)

			In	p
PRETEST	-	POSTEST	0.941	0.056

Note. Significant results suggest a deviation from normality.

The descriptive data showed that the average score in the pretest was 76.689 with a standard deviation of 8.598, while the average score in the posttest increased to 82.683 with a standard deviation of 8.088. The coefficient of variation also decreased from 0.112 in the pretest to 0.098 in the posttest, indicating a reduction in relative diversity in the posttest data. The following are the results of a descriptive analysis of the use of joyful learning-based interactive media:

Table 3. Descriptives Analysis Result

Descriptives

	N	Mean	SD	HERSELF	Coefficient of variation
PRETEST	36	76.689	8.598	1.433	0.112
POSTEST	36	82.683	8.088	1.348	0.098

The descriptive plots showed a clear increase in posttest scores compared to pretest, corroborating the results of statistical analysis that there was a significant increase after treatment. The following is a picture of the results of the descriptive analysis:

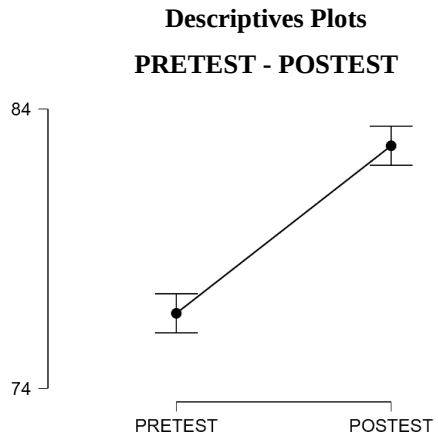

Figure 1. Descriptives Plots Result

The results of the study showed a significant increase in student learning outcomes in descriptive text writing materials. This can be seen from the comparison between the pretest and posttest scores carried out on the sample group. The average pretest score is in the fair category with an average score of 76,689, while the average posttest score increased to 82,683, which is included in the good category. This increase indicates the effectiveness of the interactive media-based approach in Indonesian language learning, especially in descriptive text writing materials.

In the group of students who used joyful learning-based interactive media, neurolinguistic activities such as vocabulary processing, sentence structure, and description structuring showed good results. Observational data showed that students had more active brain responses, as measured through observation of students' verbal and nonverbal activities in the learning process. This is in line with the theory that the use of interactive media can increase brain stimulation in students' linguistic and cognitive areas [24].

In addition, the results of the questionnaire showed that the students' response to joyful learning-based learning was very positive. As many as 92% of students feel more motivated to learn, and 85% of students revealed that learning feels more enjoyable than previous learning methods.

Students also appreciate the use of interesting media such as interactive images, videos, and educational game simulations that are relevant to the material.

Analysis of the Impact of the Use of Interactive Media on Students' Neurolinguistic Ability

The use of joyful learning-based interactive media shows a positive impact on students' neurolinguistic abilities. This media is able to stimulate brain activity in the prefrontal cortex which plays a role in language analysis and creativity [9]. Students who are exposed to interactive media exhibit richer and structured descriptive abilities, as they have learning experiences that engage the senses as a whole, such as visual, auditory, and kinesthetic. These results support previous research that states that interactive technology-based approaches can improve linguistic skills through more meaningful learning experiences [25]

Factors Supporting the Success of Joyful Learning

The success of joyful learning in this study is supported by several main factors. First, the design of interactive media that is attractive and relevant to the needs of students is a key aspect [26]. The media used is not only entertaining, but also has a clear educational element. Second, the role of teachers as active facilitators creates a comfortable learning atmosphere and supports student exploration [27]. Third, high student participation, because learning is designed to involve students directly in creative activities such as describing pictures or composing text through digital applications [28].

Obstacles in the Implementation of Interactive Media and Solutions

Despite showing positive results, the implementation of interactive media is inseparable from obstacles. One of the main obstacles is the limitation of technological devices in some schools, especially in areas with minimal internet access [29]. The proposed solution is to utilize interactive media that can be accessed offline, such as the use of local-based applications that do not require an internet connection. In addition, teacher training is needed to improve their technical skills in operating interactive media so that it can be optimally integrated into the learning process [30]. Another obstacle is the limited time for technology-based learning preparation [31]. To overcome this, more careful planning and additional time allocation are needed to adapt the media according to the needs of the curriculum.

4 Conclusion

This study revealed that joyful learning-based interactive media has proven to be effective in improving neurolinguistic activities and language learning outcomes of elementary school students. This approach not only helps students in understanding the material better but also creates a pleasant learning atmosphere thereby increasing student motivation and engagement significantly. Joyful learning-based learning also contributes to maximizing brain function, especially in areas related to language analysis, creativity, and critical thinking skills.

Based on the findings of this study, there are several recommendations that can be implemented to support learning success. 1) Teachers are advised to actively integrate joyful learning-based interactive media in the language learning process. This media can help create a more meaningful learning experience and support the development of students' linguistic skills. 2) Special training is needed for teachers to improve their ability to design and utilize joyful learning-based interactive media. This training can cover the use of technology, educational media design, and implementation strategies in various classroom conditions. 3) Further

research is recommended to explore the influence of joyful learning-based interactive media on other language skills, such as listening, speaking, reading, and critical thinking. In addition, research with a focus on different levels of education can provide a more comprehensive picture of the effectiveness of this method. By implementing these recommendations, it is hoped that the language learning process can become more innovative, inclusive, and provide optimal results for students in various educational settings.

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