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DEDUCTIVE VS INDUCTIVE: WHICH METHOD INFLUENCES STUDENTS WRITING SKILLS

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Abstract

Writing is an important academic skill that needs to be developed to succeed in education and a future career. Poor teaching techniques or methods contribute to students' difficulties in learning to write. So that teachers need to use appropriate learning methods so that students can succeed in their learning. Based on this, the aim of this research is to compare the influence of deductive and inductive methods in students' writing learning. The experimental method and quasi-experimental research design were used in this study. This study used a two-group pretest-posttest research design. The research subjects consisted of two classes, namely one class for experimental class 1 using deductive learning and one class for experimental class 2 using inductive learning. The research instrument is a performance test. Data analysis is a statistical analysis using SPSS. The results showed that the deductive and inductive learning methods were quite effective in teaching students' writing. Based on the analysis, it was found that there was no difference in learning outcomes between learning to write using deductive and inductive methods.

Keywords: Deductive Method, Inductive Methods, Writing Text.

INTRODUCTION

Writing is an important means of communication used to interact with each other. It has a set of functions that are socially valuable [1]. In its simplest form, writing is the process of using letters or symbols to communicate thoughts in a readable form using symbols such as letters of the alphabet, punctuation, and spaces [2][3]. Writing is a literary art in which individuals practice expressing their feelings, thoughts, situations and experiences in writing [4]. It plays a significant and effective function in enhancing human knowledge and creating encyclopaedic individuals [5]. Writing is used for different purposes, from writing letters or e-mails to sending SMS. It is used for almost anything and in different ways such as by using pen and paper, computer, with fingers, through marks or even on sand [6].

Writing is an important academic skill that needs to be developed to succeed in education and a future career [7][8]. Writing skills are language skills that students must acquire and improve from the first year of their educational life [9]. While spoken language has existed since ancient times and can usually be learned without formal instruction, writing is a technique that has lived for only a relatively short time and must be taught to every generation from childhood [2]. Since approximately half of practice in the school setting requires writing, the activities used to improve this skill are more important than any other skill [9].

Writing skills are the ability to express opinions in personal language, including the ability to express language, cognitive abilities in observation, and analytical abilities [10]. Writing skills are high-level thinking skills which are also considered as processes that encourage metacognitive skills [11]. Writing instruction enhances students' abilities to acquire, comprehend, construct, and reflect new information [12]. In addition, students have the opportunity to verbally communicate with their peers and

teachers through written products. The significance of teaching writing at all grade levels cannot be denied due to the fact that writing is a skill-intensive activity that fosters development. Writing encompasses multiple literacy [13].

Writing is a complex learning process where students explore their thinking, find more innovative ideas, and generate meaning [14]. These skills are not only complex processes but also expressions of thought [15]. Writing helps students think [16][17] because to convey messages that are easy to understand, clear, coherent, and neat, one must be able to transform abstract ideas into concrete concepts that can be clarified explicitly [18]. In addition, writing promotes language development and academic success [19]. They also use it to enhance and enrich knowledge [20][21].

Among the main language skills, writing, as a productive skill, is perhaps the most challenging skill [22]–[24]. Among the four language abilities, writing includes cognitive, affective, physiological, and social processes that are complex and difficult to acquire [13]. These skills are typically taught last (if at all) after listening, speaking, and reading [6]. However, it is generally considered as the most difficult skill, where students face many challenges in writing namely: less vocabulary, poor grammar, poor spelling, and student readiness [25]. Although writing is the least preferred among language skills, writing is very important in developing other language skills because it supports other skills and is supported by other skills [15].

Teaching writing skills is a demanding job and most of it comes with several complications [26]. Most students encounter difficulties when they want to express their opinions and thoughts through written media [27]. Language instructors face considerable difficulties in teaching writing skills and motivating students to write more and better especially as a result of inadequate vocabulary knowledge and poor spelling and grammar [28]. Poor teaching techniques or methods contribute to students' difficulties in learning to write, and teaching methods or approaches have recently been strongly demonstrated as an important component. The methods or techniques used by instructors, as well as topics and writing assignments, affect students' attitudes to learning, the success of writing sessions and the level of students' writing performance [29]. Among the methods that can be used in language learning are deductive and inductive methods.

Inductive and deductive teaching approaches are important elements in the development of effective education. It is not only important in increasing the professional potential of teachers but also helping to improve students' intellectual skills and capacities [30]. Deductive and inductive approaches have been shown to give students the ability to rationalize what information is needed and make them aware of the intent and content of the lessons presented to them [31]. Deductive and inductive teaching methods are vastly dissimilar and contradict one another in numerous ways [32]. Some studies conclude that the inductive approach may be more profitable than the deductive approach, while others conclude that the deductive approach is more efective, and still others claim that there is no difference between the two approaches [33].

Rivers and Temperley's (1990) deductive approach to teaching grammatical structures represents a more traditional or teacher-centered style of instruction [34]. The teacher is the authority, the lecturer, and the information source, while the students are passive recipients [35]. This method is teacher centered and expository [36]. With the deductive approach, as with the rationalists, truth comes with predetermined logical

concepts [37]. It is a more instructor-focused methodology which implies that the educator gives students another idea, explains it, and after that students use the concept [38]. Thus, the emphasis of this learning is on concepts and the ability to apply principles to new situations [39].

Typically, this procedure is utilised in large classroom settings. The learner is provided with general principles, which are then applied to specific language examples and refined via practise questions [40]. Students in this deductive learning environment will therefore experience the approval and construction of knowledge. In addition, they are permitted to assess their conceptual understanding through exercises that facilitate the growth of their skills and abilities [39]. In a deductive class, the instructor provides lessons by introducing and explaining concepts to the students, who are then expected to complete worksheets or exercises to practise these concepts [32].

The deductive approach goes from general (rules, laws, principles or formulas) to specific (examples); unknown to know; and abstract laws to concrete examples [41]. This reasoning is unique because it is a process of drawing conclusions from known information (premises) based on formal logic rules, where conclusions must be derived from the supplied information and do not require experimental validation [42], [43]. The deductive method can put significant demands on teachers in terms of concept planning [30]. The deductive approach, on the other hand, may be more restrained and change from easy to difficult, but may discourage students from discovering different things on their own due to its teacher-centered nature [41]

The inductive approach, on the other hand, appears to be a more contemporary manner of instruction that is presented in the context of a real language or a learner-centered approach [34]. The inductive approach was sponsored by Pestalozzi and Francis Bacon [41]. This instruction is based on inductive reasoning, cognitive growth, and constructivist epistemology [35]. This learning is closer to empiricism, namely knowledge comes from experience and observation [37]. Through learning using this approach students are trained to make generalizations [44]. Inductive learning begins with observation, experience and case studies, then continues with theory [45].

Inductive teaching refers to an instructional approach in which learners are first exposed to an educational challenge and explore it to overcome it. Inductive teaching utilizes the use of students as resources in the classroom [33]. The inductive approach involves learners detecting, or noticing, patterns and constructing 'rules' for themselves before they practice the language [40].

This refers to the manner in which a language context containing target rules is introduced so that students can infer these rules from context and practical examples [46]. In this lesson, examples are first contributed and then students themselves try to formulate rules. Thus, they move from broad themes to more focused forms [47].

Directed inductive instruction that begins with 'the specific,' requiring students to interpret a series of observations or experimental data, analyse a case study, or solve a complex real-world problem [30]. When students try to analyze and interpret these specific examples with some guidance and other assistance from the teacher, students then realize or find generalizations [48]–[50].

In this strategy, from the initial stage, a problem is handled based on past information, thoughts, and knowledge of students. Thus, students do not think of any equations, standards, or techniques to solve a given problem [38].

This allows for easier retention of the rules than if students are given explanations disconnected from the rule examples [32].

The inductive procedure is efficient when applied to small student groups [40]. Rather than being based on a teacher-facing transmission-style classroom, this learning is student-centered and allows students to engage thoroughly in the language they are learning while also providing the opportunity for reflection [31].

Inductive learning improves academic achievement and better prepares students for real-world problems [51]. As is known globally, inductive learning is strengthened by different perceptions and this can be realized through experience. So, this experience and inductive way will be led by intelligence [37]. Based on these explanations, the purpose of this study was to compare the effect of deductive and inductive methods on students' learning to write.

METHOD

The experimental method and quasi-experimental research design were used in this study. This study used a two-group pretest-posttest research design. Two experimental groups were used in the two-group pretest-posttest design, where students were given various treatments. By administering the final test (posttest), measurements were made on students before treatment (pre-test). The research population was students who took Indonesian language courses at a university in West Sumatra.

The population is 8 classes, each class consisting of 40-50 students. Two classes were selected as the sample for this study using a purposive sampling technique. This research data collection method involves a test. The test conducted is a performance test. The research instrument used a test. The test assessment will focus on language, including grammar, spelling, sentence structure, and text suitability with structure. The following are the steps for making the statistical analysis method used to process research data using SPSS. Do a data normality test first. Second, assessing the homogeneity of the data. Third, do the Paired Sample T-Test. Fourth, Test the Independent Sample T Test and determine the N-Gain.

Table 1: Research Design

Class	Pretest	Treatment	Post test
Experiment 1	O1	Deductive	O1
Experiment 2	O2	Inductive	O2

Learning steps with the deductive method are carried out with stages starting with a clear introduction to the problem; seek tentative hypotheses; formulate hypotheses and end with verification.

Whereas the deductive method begins by showing examples of the same type; then students detect and observe to reach conclusions; then generalization is carried out to establish a theory and ends with proof. The second steps of learning can be seen in the following figure 1.

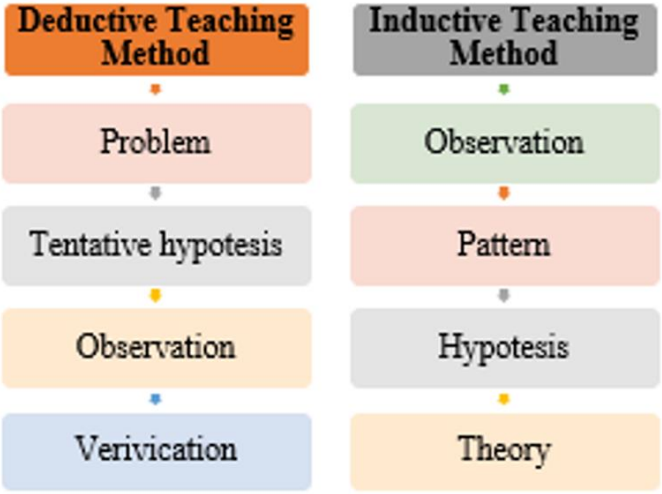

Figure 1: Stages of Deductive and Inductive Teaching Methods

RESULT

The results of this study were acquired in the form of student writing test scores based on the results of the pre-test and post-test trials in both groups, experimental group 1 and experimental group 2. Following is a description of the obtained research results. Initially, characterise the SPSS-processed data's descriptive statistics. This section provides a descriptive statistical analysis of table 2's data from the present investigation.

Table 2: Descriptive Table

	N	Min.	Max.	Mean	Std. Deviasi
Pre-test Experiment Class 1	40	70	80	73.20	0.56750
Post-test Experiment Class 1	40	84	100	89.50	0.76040
Pre-test Experiment Class 2	40	60	80	72.85	0.81614
Post-test Experiment Class 2	40	80	100	88.45	0.62219

According to table 2, there is not a great deal of variation between the average learning outcomes of experimental class 1 and experimental class 2. Using SPSS, it is necessary to conduct statistical tests on student learning outcomes to ensure that there is a significant difference. Second, evaluating the trial data's normality. This study used the Shapiro-Wilk test with a significance level of 0.05 to examine the normality of the data. After processing sata with the SPSS programme, the output display results are depicted in Figure 3 below.

Table 3: Test of Normality

	Group	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Pre test	Deductive methods	.281	40	.000	.800	40	.000
	Inductive methods	.190	40	.001	.885	40	.001
Post test	Deductive methods	.167	40	.007	.893	40	.001
	Inductive methods	.158	40	.013	.947	40	.061
a. Lilliefors Significance Correction							

Based on the results of calculations using the Shapiro Wilk test in table 3, it can be concluded that the significance of the score data for the four data, namely the experimental class 1 pre-test data (0.000); pre-test experimental class 2 (0.001); post-test experimental class 1 (0.001); post-test experimental class 2 (0.061). Based on

these data it can be concluded that the data is a sample that is not normally distributed for three data with sig. less than 0.05. By presenting the results of the significance data, it can be concluded that in both classes, both the pre-test and post-test data are samples that are not normally distributed. Third, test the homogeneity of the trial data. Homogeneity test was conducted to determine whether the two populations come from the same variance. The homogeneity test in this study used the Levene test with SPSS program rocks. The results of the homogeneity test can be seen in table 4.

Table 4: Test of Homogenity

	Levene Statistic	df1	df2	Sig.
Pre test	1.485	1	78	.227
Post test	2.490	1	78	.119

Based on table 4, it is obtained that the significance value on the average pretest and posttest data is 0.227 and 0.119 provided that the significance level or probability value is more than 0.05, it can be said that the population has the same or homogeneous variance. Fourth, Paired Sample T Test. This test is used to determine whether the difference in the mean of two paired samples. In this study, the results obtained were used to determine whether there were differences in learning outcomes after using the deductive method and the inductive method. To answer this question, the Paired Sample T Test was carried out on the pre-test data for the experimental class and the post-test for the experimental class using non-parametric statistics, namely the Wilcoxon test, because the data analyzed were not normally distributed. The trial results can be seen in table 5 and table 6.

Table 5: Wilcoxon Test (Deductive Methods)

Ranks				
		N	Mean Rank	Sum of Ranks
Post_test - Pre_test	Negative Ranks	0[a]	.00	.00
	Positive Ranks	40[b]	20.50	820.00
	Ties	0[c]		
	Total	40		
a. Post_test < Pre_test				
b. Post_test > Pre_test				
c. Post_test = Pre_test				

Test Statistics[b]	
	Post_test - Pre_test
Z	-5.527[a]
Asymp. Sig. (2-tailed)	.000
a. Based on negative ranks.	
b. Wilcoxon Signed Ranks Test	

Based on the Negative Ranks data, it shows that there is no reduction in the value of learning outcomes from pre-test scores to post-test scores in the experimental class using the deductive method. In addition, based on the value of Positive Ranks, it shows that as many as 40 students have an increase in learning outcomes from pre-test scores to post-test scores. Furthermore, based on the table, there is no the same value between the pre test and post test. Based on the test statistics table shows that the Asymp. Sig. (2-tailed) is worth 0.000. because the Asymp value. Sig. (2-tailed) < 0.05, it can be concluded that there is an effect of using the deductive method on student learning to write.

Table 6: Wilcoxon Test (Inductive Methods)

Ranks				
		N	Mean Rank	Sum of Ranks
Post_test - Pre_test	Negative Ranks	0[a]	.00	.00
	Positive Ranks	40[b]	20.50	820.00
	Ties	0[c]		
	Total	40		
a. Post_test < Pre_test				
b. Post_test > Pre_test				
c. Post_test = Pre_test				

Test Statistics[b]	
	Post_test - Pre_test
Z	-5.522[a]
Asymp. Sig. (2-tailed)	.000
a. Based on negative ranks.	
b. Wilcoxon Signed Ranks Test	

Based on the Negative Ranks data, it shows that there is no reduction in the value of learning outcomes from pre-test scores to post-test scores in the experimental class using the inductive method. In addition, based on the value of Positive Ranks, it shows that as many as 40 students have an increase in learning outcomes from pre-test scores to post-test scores. Furthermore, based on the table, there is no the same value between the pre test and post test. Based on the test statistics table shows that the Asymp. Sig. (2-tailed) is worth 0.000. because the Asymp value. Sig. (2-tailed) < 0.05, it can be concluded that there is an effect of using the inductive method on student writing learning. Based on the results of the analysis of the normality test and homogeneity test, the conclusions obtained are that the data is not normally distributed, but is homogeneous. The results of the mean difference test in this study were carried out with the Mann U Whitney test which can be seen in table 7.

Table 7: MannU Whitney Test

	Learning_outcomes
Mann-Whitney U	718.500
Wilcoxon W	1538.500
Z	-.796
Asymp. Sig. (2-tailed)	.426
a. Grouping Variable: Group	

Based on the test results obtained sig. (2-tailed) of 0.426 > 0.05, it can be concluded that there is no difference in the average student learning outcomes using the deductive method compared to using the inductive method. Sixth, find out the effectiveness of using learning models or treatments by looking for Normalized gain (N-gain Score). To calculate N-gain, you can be guided by the following formula.

$$\text{N Gain} = \frac{posttest\ score - pretest\ score}{ideal\ score - pretest\ score}$$

Based on the results of the analysis using SPSS, it shows that the average N-gain score for experimental class 1 (deductive method) is 61.47 or 61% included in the moderately effective category with a minimum N-gain of 33% and a maximum N-gain of 100%. Meanwhile, the average N-gain score for experimental class 2 (Inductive Method) was 57.1741 or 57% included in the fairly effective category with a minimum

N-gain of 23% and a maximum N-gain of 100%. Based on these data, it shows that the deductive and inductive methods are quite effective in improving students' writing skills. Furthermore, a comparison of the difference in effectiveness between the deductive and inductive methods was carried out by means of the Independent Sample t test for the N-Gain Score with SPSS. Prior to the t test, the normality and homogeneity tests of the N-gain score were carried out first. Based on the results of the analysis using SPSS, the N-gain score is not normally distributed and is homogeneous. This is based on an analysis using SPSS with sig. > 0.05, namely 0.014 (for N-Gain percent data of the deductive method) and 0.694 (for the percent N-Gain data of the inductive method). Therefore, the Mann U Whitney test was carried out for the Ngain Score which can be seen in table 8.

Table 8: MannU Whitney Ngain Persen

	NGain_Persen
Z	702.500
Wilcoxon W	1522.500
Z	-.940
Asymp. Sig. (2-tailed)	.347
a. Grouping Variable: Group	

Based on the output table above, it is known that the Asymp value. Sig. (2-tailed) above, amounting to 0.347> 0.05, thus it can be concluded that there is no significant (real) difference in effectiveness between learning using the deductive method and the inductive method.

DISCUSSION

Based on the results of the analysis it was found that the deductive and inductive learning methods were quite effective in teaching students' writing. Several studies have shown that the use of the deductive method is effective in increasing learning outcomes [31][33][52][53][54][55], While several studies have shown that the inductive method is effective in improving learning outcomes [50][56][57], Several studies have also shown the effectiveness of the two methods [58-[59].

Deductive learning management refers to the teacher's practise of organising learning activities by explaining principles through examples. Typically, teachers begin by explaining the rules to students, who then grasp the rules and complete the lesson [39]. Deductive learning offers opportunities to learn, because this model fosters a cooperative atmosphere among students [31]. This learning is a communicative approach by encouraging students to be active in learning activities based on existing facts and examples [60]. This learning can increase problem-solving skills, besides that students can determine causal relationships more clearly and precisely [61].

The use of the inductive approach has been noted for its success in classrooms around the world [40]. The inductive approach may be more attractive because it is learner-centred and encourages learner autonomy [30][62][63]. The inductive method can provide good services for teachers who have problems in maintaining discipline, concentration, and busyness of their students, because it partially eliminates these problems [31]. This learning offers students motivation through the challenges of completing projects with material presented in class, so that students can complete their projects by solving cases, interpreting data, or applying knowledge to real-world scenarios [51]. Knowing that they can make up the rules by their own example

significantly increases students' motivation, making them attentive, more actively engaged, confident, and enthusiastic about the learning process rather than passive recipients. In addition, knowing that they can help the learning process run more efficiently increases efficiency [31].

CONCLUSIONS

Based on the results of the research and discussion it was found that the deductive and inductive learning methods were quite effective in teaching students' writing. Based on the analysis it was found that there was no difference in learning outcomes between learning to write using deductive and inductive methods. Based on that, teachers can use either of the two methods or both in learning language, especially learning to write, especially in tertiary institutions. In addition, future researchers can use this learning method to be developed again according to the learning material.

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