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Research Article

The Effect of Discovery Learning Model on Students' Explanatory Text Writing Skills

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ABSTRACT

An investigation was conducted to assess how the discovery learning model impacts the writing abilities of seventh-grade learners, specifically in their creation of explanatory texts. The research methodology incorporated a quasi-experimental design, utilizing nonequivalent control groups that divided participants into two distinct classroom settings. The research sample encompassed 256 seventh-grade pupils, where Class VII-1 functioned as the treatment group and Class VII-2 operated as the comparison group. Upon evaluating posttest outcomes, researchers identified substantial performance variations between groups, with treatment participants scoring 76.34, while comparison participants averaged 70.15. Statistical analysis through normality assessments demonstrated regular data distribution patterns, and homogeneity evaluations confirmed equivalent variances across groups. Statistical computations produced a t-test value of 2.02 ($\alpha = 0.05$), exceeding the established critical threshold of 1.9989. These findings led to rejecting the null hypothesis (H0), establishing that learners educated via the discovery learning model demonstrated significantly enhanced writing abilities compared to peers receiving traditional instructional approaches.

Keywords: Discovery Learning Model, Writing Ability, Explanatory Text

INTRODUCTION

Implementing the 2013 curriculum aims to enhance students' engagement in educational activities while fostering their creative thinking capabilities. Furthermore, educators, in their professional capacity, are required to design and implement innovative instructional approaches that facilitate behavioral transformation in the classroom environment, ultimately striving to maximize individual student achievement outcomes [1, 2]. Maximum learning outcomes are obtained from good learning quality [3]. Good learning quality involves a learning process involving students while the teacher acts as a facilitator, innovator, and motivator [4]. Indonesian language learning in the 2013 curriculum takes a text-based approach, which means that the essential competencies for Indonesian language courses include competencies connected to several texts that students must master. Text-based learning includes observation, descriptive, expository, explanatory, and short story texts [5, 6].

The acquisition of language competency encompasses four fundamental domains: listening, speaking, reading, and writing capabilities [7]. Writing proficiency holds particular significance in both educational contexts and broader societal interactions [8]. Among the essential linguistic competencies that learners must develop, writing ability stands as a crucial component. Through written expression, learners gain the capacity to articulate their thoughts, perspectives, and emotional responses [7]. Furthermore, writing enhances students' analytical reasoning and imaginative capabilities in written communication [9]. As a form of indirect communication, writing represents a distinct linguistic skill that enables written discourse [9]. Effective written communication demands considerable expertise to ensure reader comprehension of the message. Among various academic competencies, writing proficiency often emerges as an area where students demonstrate less enthusiasm. This reluctance typically stems from students' perceived inability to compose written works, particularly when confronting tasks such as crafting explanatory text.

A specific category of written composition known as explanatory text illuminates and details both natural and societal mechanisms or occurrences [10]. When composing an explanatory text, authors aim to elucidate operational processes or demonstrate the sequence of events leading to learning outcomes. Such texts primarily address inquiries centered around causation and methodology, responding to readers seeking to understand the mechanisms ("how") or reasoning ("why") behind various phenomena [11]. Students' skills in writing explanation texts must be improved because, with the skills of writing explanation texts, students can find out about natural or social phenomena in their surroundings [12, 13]. Among the various formats of explanatory texts, scholarly essays effectively illustrate natural and social processes [14]. These compositions enable learners to comprehend complex occurrences, such as volcanic activities or flooding events, by detailing their underlying mechanisms. To enhance students' engagement with explanatory text composition, educators must implement pedagogical approaches that activate learners' cognitive processes and inspire their written expression.

Based on an initial observation conducted by researchers with Indonesian language education teachers in junior high school, several students did not meet the minimum completion criteria for writing explanation texts, so the results were not optimal. This is shown from the learning process of giving assignments, namely writing explanatory text exercises, as the minimum completion criteria applied to the Indonesian language subject at this school is 72 out of 100. The current problem is using inappropriate learning models or media in writing explanatory texts. So, teachers must choose a learning model or media that can encourage students that they can write. In addition, other factors are the lack of student motivation in learning Indonesian, limited knowledge, ideas, and concepts in writing explanatory texts, and the lack of student interest in learning Indonesian [15] [16].

Researchers have identified a solution to enhance students' capacity for crafting explanatory texts by implementing the discovery learning model, which aims to foster creativity and originality in their written work. The discovery learning model enables learners to uncover concepts independently [17]. This pedagogical approach emphasizes exploring unfamiliar principles and subject matter that students have not previously encountered [18][19]. Rather than presenting educational content directly, the discovery learning model guides participants toward independently investigating predetermined instructional materials [20]. The selection of this instructional methodology stems from its inherent ability to engage students in autonomous exploration of environmental and natural processes, thereby facilitating their development of explanatory text composition skills. Within this context, the investigation examines the impact of the discovery learning model on students' written expression capabilities.

METHODS AND METHODOLOGY

The investigation adopted a Quasi-Experimental approach, explicitly implementing a Non-equivalent Control Group Design. This methodological choice stemmed from the necessity to work with pre-existing classroom configurations rather than establishing new groupings. The research framework incorporated two student populations: one cohort implemented the discovery learning model (experimental section), and the other followed conventional instructional approaches (control section). The research participants comprised seventh-grade pupils at a Tangerang junior high school. From a total student body of 256 individuals, the study focused on two specific class sections: VII-1 (designated as the control group) and VII-2 (serving as the experimental group), each containing 32 learners.

The successful execution of the research hinged significantly on the data-gathering protocols employed. The investigation utilized assessment-based data collection strategies. Before implementing any instructional interventions, researchers administered an initial evaluation (pretest) to establish baseline student competencies. After completing classroom instruction, participants underwent a subsequent assessment (posttest), which featured multiple questions designed to evaluate their comprehension and mastery of the instructional content delivered. Pretest and posttest are tests used to measure students' abilities or understanding of explanatory text material about landslides. The test used is in the form of an essay test. The method employed in data analysis within quantitative research predominantly utilizes statistical analysis. Within the context of research data analysis, two distinct categories of statistics exist, specifically descriptive and inferential statistics [21].

RESULTS

Pretest and Posttest Descriptive Data

The preliminary analysis phase involves the research team's statistical processing of descriptive data. Through visual representations such as tables, graphs, and histograms, the collected information undergoes systematic organization

and presentation. The analytical process encompasses the computation of key statistical measures derived from pre-assessment and post-assessment score evaluations, including the mean, mode, median, and standard deviation. The comprehensive descriptive statistical findings are presented as follows:

Table 1. Descriptive Statistics

Type of test	N Sample	Class	Lowest	Highest	Mean	Median	Mode	Std. Deviation
Pretest	32	Control	30	80	57.62	58.3	60.28	13.28
		Experiment	30	85	63.53	63.79	62.8	11.30
Posttest	32	Control	40	87	70.15	71	73.7	12.63
		Experiment	40	90	76.34	78.74	81.9	11.9

Statistical examination of the control group's pretest data involving 32 participants revealed performance metrics ranging from a minimum of 30 to a maximum of 80 points. Statistical computations indicated that participants achieved an average (mean) score of 57.62, with a median value of 58.3 and a modal score of 60.28. The distribution's standard deviation was calculated at 13.28. Comparative analysis of the experimental group's pretest performance in explanatory text composition, comprising 32 participants, demonstrated a similar minimum score of 30 but a higher maximum score of 85. Statistical measures for this group yielded a mean score of 63.53, a median of 63.79, and a mode of 62.8. The spread of scores in this group showed less variation, with a standard deviation of 11.30.

Statistical examination of the control group's posttest data, comprising 32 participants, revealed scores ranging from 40 to 87. Statistical computations indicated that participants achieved a mean score of 70.15, with a median of 71 and a mode of 73.7. The distribution exhibited a standard deviation of 12.63. An analysis of the experimental group's posttest performance in writing explanatory texts involving 32 participants demonstrated a score range of 40 to 90. Statistical measures for this group yielded a higher mean score of 76.34, a median of 78.74, and a mode of 81.9. The experimental group's score distribution showed a standard deviation of 11.9.

Inferential Statistics

Test of Normality

The chi-square normality test was implemented to examine experimental and control group datasets. This statistical evaluation aimed to determine the distribution pattern of the sample populations. The assessment of normality involves comparing two key values: the computed X2 statistic and the X2 critical value from standard tables. The interpretation follows a specific decision rule: when the computed X2 statistic falls below the X2 table value, researchers accept the null hypothesis (H0), indicating the normal data distribution. Conversely, if the computed X2 statistic exceeds the X2 table value, the alternative hypothesis (Ha) is supported, suggesting a non-normal distribution.

Table 2. Test of Normality Result

Type of test	Class	X^2 count	X^2 table	Result	Interpretation
Pretest	Control	2.27	11.07	Accept H_0	Data is normally distributed
	Experiment	2.78	11.07	Accept H_0	Data is normally distributed
Post-test	Control	1.99	11.07	Accept H_0	Data is normally distributed
	Experiment	5.96	11.07	Accept H_0	Data is normally distributed

Statistical analysis of the control group's pretest results revealed X2count = 2.27, which falls below the X-table value of 11.07 (significance level: 5% or 0.05, n=32), indicating normal data distribution. Similarly, examination of the experimental group's pretest scores demonstrated X2count = 2.78, also less than the X-table value of 11.07 (significance level: 5% or 0.05, n=32). Given that X2count = 2.7875 < X-table = 11.07, the experimental group's pretest data also exhibited typical distribution characteristics.

Analysis of the control group's posttest results revealed a calculated value of X2 = 1.99, which falls below the table value of 11.07, using a 5% (0.05) significance threshold and a sample size of 32 participants. This statistical comparison (X2 = 1.99 < X table = 11.07) demonstrates that the control group's posttest data follows a typical distribution pattern. Similarly, examination of the experimental group's posttest data yielded X2 count=5.96, also less than the table value of 11.07, under identical conditions (5% significance level, n=32). The relationship

X2count=5.9689 < X table=11.07 confirms that the experimental group's posttest results exhibit typical distribution characteristics.

Test of Homogeneity

Researchers implemented the Fisher test to evaluate the uniformity between experimental and control groups, which analyzes variation equivalence across both classes. This statistical procedure determines population homogeneity by examining whether the variance between classes demonstrates equality. The assessment employs specific parameters: data is classified as homogeneous when the F-count value falls below the F-table value. At the same time, heterogeneity is indicated when the F-count exceeds the F-table threshold. The analysis was conducted using a 5% significance level (0.05). The initial testing calculations yielded the following outcomes.

Table 3. Test of Homogeneity Result

Type of test	F-count	F-table	Result	Interpretation
Pretest	1.38	1.82	Accept H_0	Data is homogenous
Posttest	1.12	1.82	Accept H_0	Data is homogenous

Analysis of the homogeneity assessment comparing the experimental and control groups' pretest data revealed statistical values of F-count (1.38) and F-table (1.82). This demonstrated homogeneous population variants since the F-count value was lower than the F-table value (1.38 < 1.82). Similarly, examination of the posttest data yielded an F-count of 1.12 against the F-table value of 1.82. The F-count again falling below the F-table measurement (1.12 < 1.82) confirmed that population variants maintained their homogeneous nature throughout the study.

Test of Hypothesis

The research employed a t-test methodology for analyzing the data, explicitly utilizing The Separate Model T-test formula, as the sample exhibited characteristics of homogeneity and normal distribution. The statistical evaluation framework established that when the calculated t-value falls below the tabulated t-value (t count < t table), the null hypothesis (H0) must be rejected, indicating no statistical distinction in explanatory text writing ability between students exposed to the discovery learning model versus those following the regular learning model. In contrast, when the calculated t-value exceeds the tabulated t-value (t count > t-table), the alternative hypothesis (H1) is supported, demonstrating a significant variation in explanatory text writing ability between learners taught via the discovery learning model compared to those receiving conventional instruction.

Table 3. Test of Hypothesis Result

Type of test	T-count	T-table	Result
Pretest	1.910	1.998	Accept H_0
Posttest	2.020	1.998	Accept H_1

Initial examination of pretest results revealed normal distribution and homogeneity characteristics in the dataset. The researchers implemented a Separate Model T-test to evaluate differences between the two classes under study. Statistical calculations yielded a t-count value of 1.910, while the t-table value was established at 1.998 with a 0.05 significance threshold. The statistical comparison demonstrated that the t-count (1.91) fell below the t-table value (1.9989), leading to the acceptance of the null hypothesis (H0). This outcome indicated that prior to implementing the discovery learning method, no substantial variations existed in students' explanatory writing skills when comparing the control and experimental groups.

Statistical examination of the posttest results revealed the dataset's normal distribution and homogeneity characteristics. Using the Separate Moodle T-test methodology, the researchers implemented a comparative analysis between the two groups. Statistical calculations yielded a t-count value of 2.02, while the t-table value was established at 1.998 with a 0.05 significance threshold. Given that the computed t-count (2.020) exceeded the t-table value (1.9989), the research hypothesis H1 was supported. This statistical outcome demonstrated that implementing the discovery learning method substantially influenced students' explanatory writing skills when comparing the experimental and control groups.

DISCUSSION

Analysis of the experimental data revealed that students exposed to the discovery learning model demonstrated superior explanatory text-writing skills, achieving higher mean scores than their counterparts who underwent conventional instruction. Throughout the instructional sessions, the researcher's involvement was limited to presenting educational content, with learners assuming a passive role of listening and transcribing the instructor's information. In assignments requiring explanatory text composition, students produced content based solely on their existing capabilities, lacking the instructor's motivational or intellectual prompts. The learning process results in the control class being less stimulated and cannot be adequately developed since the teacher only used conventional teaching methods and delivered the learning materials using a textbook. Students should be allowed to learn and actively find learning resources, not just rely on teacher explanations.

The instructional approach in the experimental group implemented a distinctive methodology, initiating an instructor-led inquiry regarding an explanatory text focused on "Landslides." Students engaged through multimedia stimuli, incorporating visual materials depicting landslide phenomena. Subsequently, participants were encouraged to conduct problem identification and analytical assessment of the subject matter, documenting multiple relevant issues. The investigation phase allowed learners to gather evidence from diverse resources to evaluate their hypotheses. This autonomous research process encompassed peer consultation, textbook examination, and comprehensive data collection, enabling students to develop problem-solving strategies aligned with their understanding. Following data compilation, participants processed information and commenced crafting explanatory texts. The procedure included thorough revision and synthesis of findings into coherent conclusions, culminating in oral presentations before their peers. Notable differences emerged in classroom dynamics, with experimental group participants demonstrating heightened enthusiasm and participation compared to their control group counterparts. The research outcomes revealed significant distinctions in explanatory text writing ability between students exposed to the discovery learning model versus those receiving traditional instruction.

This research finding has a similar result to that of other researchers. Munadar (2021), Ariyana et al. (2020), and Prasetyo and Abduh (2021) result also indicated that the discovery learning model could improve students' writing skills [18, 19] [22]. Research indicates that implementing discovery learning in educational settings yields enhanced transfer effects in student achievement [23]. This transfer effect represents how previously acquired knowledge influences subsequent educational experiences, extending beyond academic settings and producing lasting impacts on future learning. Studies demonstrate that the discovery learning model enhances students' analytical reasoning capabilities and innovative thought processes [24][25]. Through this approach, learners develop advanced cognitive abilities as they independently navigate challenges and generate solutions, ultimately strengthening their capacity to conceptualize and express ideas through written communication.

CONCLUSION

Statistical analysis of this research demonstrates several key outcomes: the experimental group achieved superior mean scores compared to the control group, with data exhibiting normal distribution and homogeneous variance. Statistical significance emerged through t-test analysis, highlighting the distinctive influence of the discovery learning model on students' writing skills. The research established marked distinctions in explanatory text composition abilities between learners exposed to the discovery learning model and those receiving conventional instructional methods. The enhancement in students' explanatory text writing skills correlated strongly with educational benchmark attainment, as implementing the discovery learning model fostered heightened learning engagement and active participation among students. Consequently, the implementation and efficacy of the discovery learning model proved both effective and successful in achieving its intended educational objectives.

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Data Availability

This study did not involve the creation or analysis of new data. Therefore, data sharing does not apply to this article.

Conflict of interest

The authors state that there are no conflicts of interest.

REFERENCES

[1] Wu YJ, Chen J-C. Stimulating Innovation with an Innovative Curriculum: A Curriculum Design for a Course on New Product Development. *The International Journal of Management Education* 2021; 19: 100561.

[2] Rahimi H, Hejazi SY, Lou NM, et al. Are teachers with better quality of work life more innovative? The mediating roles of psychological empowerment and teaching mindsets. *Acta Psychol (Amst)* 2024; 247: 104315.

[3] Luo T, Derakhshan A. Examining the role of classroom climate and teacher-student relationships in EFL students' perceived learning outcomes: A self-determination theory perspective. *Learn Motiv* 2024; 88: 102062.

[4] Szymkowiak A, Melović B, Dabić M, et al. Information technology and Gen Z: The role of teachers, the internet, and technology in the education of young people. *Technol Soc* 2021; 65: 101565.

[5] Cheng A. The place of language in the theoretical tenets, textbooks, and classroom practices in the ESP genre-based approach to teaching writing. *English for Specific Purposes* 2021; 64: 26–36.

[6] Pham VPH, Bui TKL. Genre-Based Approach to Writing in EFL Contexts. *World Journal of English Language* 2021; 11: 95.

[7] Newton JM, Nation ISP. *Teaching ESL/EFL Listening and Speaking*. Routledge, 2020. Epub ahead of print 9 September 2020. DOI: 10.4324/9780429203114.

[8] Atmowardoyo H, Sakkir G. The Development of Language Learning Theory Based on Best Practice: A Literature Review. 2021. Epub ahead of print 2021. DOI: 10.2991/assehr.k.211129.028.

[9] Fathia Baresh E. Developing Libyan Undergraduates' Writing Skills Through Reflective Journaling: A Critical Literature Review. *Journal of English Language Teaching and Learning* 2022; 3: 27–35.

[10] Dai J, Wang L, He Y. Exploring the effect of wiki-based writing instruction on writing skills and writing self-efficacy of Chinese English-as-a-foreign language learners. *Front Psychol*; 13. Epub ahead of print 10 January 2023. DOI: 10.3389/fpsyg.2022.1069832.

[11] Sasaki M, Hirose K. Explanatory Variables for EFL Students' Expository Writing. *Lang Learn* 1996; 46: 137–168.

[12] Handayani F, Kusmiatun A. Learning Writing Explanatory Text by Using the Process Approach. In: *Proceedings of the 1st International Conference on Language, Literature, and Arts Education (ICLLAE 2019)*. Paris, France: Atlantis Press, 2020. Epub ahead of print 2020. DOI: 10.2991/assehr.k.200804.031.

[13] Sætra HS. Explaining Social Phenomena: Emergence and Levels of Explanation. 2019, pp. 169–185.

[14] Bruce K. Britton, John B. Black. *Understanding Expository Text*. Routledge, 2017. Epub ahead of print 1 November 2017. DOI: 10.4324/9781315099958.

[15] Suriyanti S, Toba R, Komariah A. The Students' Problems in Writing Descriptive Text at Seventh Grade Students of Smp Negeri 3 Samarinda. *Borneo Journal of Language and Education* 2022; 2: 14–24.

[16] Nightingale P. Understanding Processes and Problems in Student Writing. *Studies in Higher Education* 1988; 13: 263–283.

[17] Svinicki MD. A Theoretical Foundation for Discovery Learning. *Adv Physiol Educ* 1998; 275: S4.

[18] Ariyana A, Enawar E, Ramdhani IS, et al. The Application of Discovery Learning Models in Learning to Write Descriptive Texts. *Journal of English Education and Teaching* 2020; 4: 401–412.

[19] Prasetyo AD, Abduh M. Peningkatan Keaktifan Belajar Siswa Melalui Model Discovery Learning Di Sekolah Dasar. *Jurnal Basicedu* 2021; 5: 1717–1724.

[20] McDaniel MA, Schlager MS. Discovery Learning and Transfer of Problem-Solving Skills. *Cogn Instr* 1990; 7: 129–159.

[21] Sugiyono. *Metode Penelitian Kuantitatif Kualitatif dan R&D*. Jakarta: Alfabeta, 2011.

[22] Munandar J, Mustika I. Writing The Procedures Text Using Discovery Learning Method in High School Students. *JLER (Journal of Language Education Research)* 2021; 4: 1–10.

[23] Jamilisti J. Pengunaan Metode Discovery Learning Sebagai Upaya Peningkatan Hasil Belajar Bahasa Indonesia. *Jurnal Multidisiplin Indonesia* 2023; 2: 1367–1373.

[24] Hasnan SM, Rusdinal R, Fitria Y. Pengaruh Penggunaan Model Discovery Learning dan Motivasi terhadap Kemampuan Berpikir Kritis Peserta Didik Sekolah Dasar. *Jurnal Basicedu* 2020; 4: 239–249.
[25] Ardhini RA, Waluya StB, Asikin M, et al. Systematic Literature Review: Model Pembelajaran Discovery Learning untuk Meningkatkan Kemampuan Berpikir Kritis. *IJoIS: Indonesian Journal of Islamic Studies* 2021; 2: 201–215.