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The Effect of SMART-Based Goal Free Evaluation Approach on Students' Analytical Skills and Self-Reflection

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Abstract

Developing students' analytical skills and self-reflection is crucial in fostering higher-order thinking abilities. However, traditional assessment methods often emphasize rigid evaluation criteria, limiting students' ability to critically assess their own learning processes. This study examines the effect of the SMART-Based Goal Free Evaluation (GFE) approach on students' analytical skills and self-reflection in an educational setting. A quasi-experimental research design was employed, involving a sample of students divided into experimental and control groups. Data were collected using analytical skill tests and self-reflection test. The data were analyzed using multivariate analysis of variance (MANOVA) to determine the effectiveness of the intervention. The findings indicate that students exposed to the SMART-Based GFE approach demonstrated significantly higher improvements in analytical skills and self-reflection compared to those in the control group. The flexible nature of GFE, which focuses on open-ended evaluation without predefined success criteria, allowed students to critically engage with their learning processes and develop a deeper understanding of the subject matter. These results suggest that integrating the SMART framework into goal-free evaluation enhances students' cognitive and metacognitive abilities, promoting independent learning and critical self-assessment. The study implies that a shift toward more adaptive and student-centered assessment strategies can significantly improve students' higher-order thinking skills and reflective learning practices.

Keywords: *SMART, Goal Free Evaluation, Analytical Skills, Self-Reflection, Higher-Order Thinking.*

Introduction

In the field of education, fostering students' analytical skills and self-reflection is essential for developing higher-order thinking abilities. Ideally, students should be able to critically evaluate information, synthesize knowledge, and reflect on their learning processes to enhance academic and personal growth (Igwe et al., 2021; Sitthipon, 2017). However, traditional assessment methods often rely on rigid grading systems and predetermined criteria, limiting students' ability to engage in deeper critical thinking and self-assessment. As a result, students frequently focus on meeting external standards rather than actively analyzing their learning experiences (Islam et al., 2022; Saß et al., 2017). This gap between the expected outcomes and the current reality highlights the need for more flexible and student-centered evaluation methods.

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Quality feedback can motivate students, provide clear direction, and support their holistic development holistic (Khaerudin, 2015; Nisrokha, 2018; Schunk & DiBenedetto, 2020). Providing good feedback is key to understanding learning progress, identifying potential, and designing further improvements and development (Astuti et al., 2018; Fuady, 2016; Nuriyah, 2014). However, there are several challenges in the practice of providing feedback at the elementary school level. Feedback provided in schools is often general, less focused on achieving learning objectives, and tends not to provide an in-depth picture of critical aspects that need to be improved or strengthened by students. This can hinder students' ability to understand and respond constructively to ongoing learning (Nuragnia et al., 2021; Rapih & Sutaryadi, 2018; Ujianti et al., 2021). In addition, feedback conducted in schools is still traditional, based on previously determined objectives or criteria. Evaluation only focuses on whether or not the objectives have been achieved. This traditional method is less flexible to help identify important aspects that may be missed because the evaluation is too focused on specific objectives

In some cases, teachers also face difficulties in detailing student achievement in a way that can be measured and managed effectively. Lack of precision in formulating and measuring specific learning objectives can lead to feedback that is less useful and less likely to encourage students to reach their full potential (Youker et al., 2014; Zurqoni et al., 2018). In addition, school culture and learning environment factors also influence the effectiveness of feedback. In some schools, a culture of less open communication between teachers and students can hinder effective feedback. This factor is compounded by the lack of training for teachers in feedback techniques that are based on strong pedagogical principles (Bayu, 2019; Bayu et al., 2018; Bayu & Arin, 2017; Bayu & Jayanti, 2019).

Previous studies have explored various assessment approaches to enhance students' analytical and reflective abilities. Research on formative assessment (Kolisnyk et al., 2022) and self-assessment strategies (Goosen & Steenkamp, 2023) has demonstrated positive effects on student learning. Additionally, goal-free evaluation (GFE) has been introduced as an alternative assessment model that emphasizes open-ended, criteria-free judgment to encourage deeper cognitive engagement (Youker et al., 2014). However, existing studies primarily focus on general formative assessment without integrating structured frameworks that enhance goal-free evaluation. The novelty of this study lies in integrating the SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) framework into the GFE approach, providing a structured yet flexible assessment model that balances open-ended evaluation with targeted learning objectives (Avando Bastari et al., 2021; Maharani et al., 2023).

This study aims to examine the effect of the SMART-Based Goal Free Evaluation approach on students' analytical skills and self-reflection. By implementing this approach, students are expected to develop a deeper understanding of the subject matter while enhancing their ability to critically analyze and reflect on their learning. The findings of this study will provide valuable insights into student-centered assessment strategies that promote independent learning and higher-order thinking skills. This research contributes to the development of a new framework in educational evaluation that combines goal-free evaluation with the SMART principle to enhance the effectiveness of learning feedback.

Method

This quasi-experimental study employed a non-equivalent pretest-posttest control group design (Siedlecki, 2020; Stratton, 2019) to examine the effectiveness of the SMART-Based Goal Free Evaluation (GFE) approach in enhancing students' analytical skills and self-reflection. The study

aimed to assess the impact of this evaluation model by implementing it in an educational setting and comparing its outcomes with conventional assessment methods.

The population of this study consisted of students from various educational institutions. The sample size was determined using the Slovin formula with a 3% margin of error, considering the diverse variations within the research population (Sugiyono, 2019). A cluster random sampling technique was applied to ensure a representative distribution across different learning environments, including rural, suburban, and urban areas. The participants were divided into two groups: an experimental group, which received instruction with the SMART-Based GFE approach, and a control group, which followed traditional assessment methods.

The research instruments were designed to measure two key competencies: analytical skills and self-reflection. The following is an Instrument grid adapted to the research on The Effect of SMART-Based Goal Free Evaluation Approach on Students' Analytical Skills and Self-Reflection shown in Table 1.

No	Measured Competencies	Indicator	Question Number
Analytical Skills			
1	Problem Decomposition	Students can break down complex problems into smaller, manageable parts.	1, 2
2	Pattern Recognition	Students can identify patterns or trends in a given problem.	3, 4
3	Logical Reasoning	Students can evaluate information and draw logical conclusions.	5, 6
4	Argument Development	Students can construct and justify arguments based on evidence.	7, 8
5	Solution Evaluation	Students can assess the effectiveness of different problem-solving approaches.	9, 10
Self-Reflection			
6	Awareness of Learning Progress	Students can assess their strengths and weaknesses in learning.	11, 12
7	Goal Setting	Students can set meaningful learning objectives for self-improvement.	13, 14
8	Critical Thinking about Performance	Students can analyze their own learning process and strategies.	15, 16
9	Emotional Regulation in Learning	Students can manage frustration and motivation during learning.	17, 18
10	Strategy Adaptation	Students can modify their approach based on past learning experiences.	19, 20

Table 1. Instrument Grid

The research instrument consists of two main components: analytical skills and self-reflection, each measured through specific indicators. Analytical skills are assessed based on five key aspects: problem decomposition, which evaluates students' ability to break down complex problems; pattern recognition, which identifies trends in problem-solving; logical reasoning, which measures the ability to analyze information and draw conclusions; argument

development, which examines students' capacity to construct and justify arguments; and solution evaluation, which assesses their ability to determine the effectiveness of different approaches. Meanwhile, self-reflection is measured through five dimensions: awareness of learning progress, which helps students assess their strengths and weaknesses; goal setting, which examines their ability to establish meaningful academic objectives; critical thinking about performance, which evaluates their capacity to analyze their own learning process; emotional regulation in learning, which explores how students manage frustration and motivation; and strategy adaptation, which assesses their ability to adjust learning strategies based on past experiences. Each aspect is evaluated using a series of test questions designed to provide a comprehensive assessment of students' cognitive and metacognitive development.

This study employs quantitative data analysis techniques, including descriptive and inferential analysis, to examine the effect of the SMART-Based Goal Free Evaluation (GFE) approach on students' analytical skills and self-reflection. Quantitative data analysis involves processing data in the form of percentages and numerical values. Descriptive analysis is used to summarize and interpret students' performance based on test scores and questionnaire responses, providing an overview of the impact of the intervention (Dantes, 2012). Meanwhile, inferential analysis is applied to test the research hypothesis and determine statistical differences between the experimental and control groups. Specifically, Multivariate Analysis of Variance (MANOVA) is employed to assess the simultaneous effect of the SMART-Based GFE approach on both analytical skills and self-reflection. Additionally, qualitative data analysis is conducted to explore students' self-reflection responses in greater depth. Open-ended responses are analyzed thematically using a coding and categorization process, identifying recurring patterns and themes related to students' learning experiences. The integration of both quantitative and qualitative findings provides a comprehensive understanding of how goal-free evaluation influences students' cognitive and metacognitive development.

Result and Discussion

Result

Descriptive Analysis

The descriptive statistical analysis was conducted to assess the impact of the SMART-Based Goal Free Evaluation (GFE) approach on analytical skills and self-reflection in student learning. The analysis includes the calculation of mean, standard deviation, minimum, and maximum scores for both variables, as presented in Table 2.

Variable	N	Min	Max	Mean	Std. Deviation
Analytical Skills	60	3	10	7.92	1.48
Self-Reflection	60	4	10	8.21	1.33

Table 2. Descriptive Statistics of Analytical Skills and Self-Reflection

Based on the results in Table 2, the mean score for Analytical Skills was 7.92, with a standard deviation of 1.48, while the mean score for Self-Reflection was 8.21, with a standard deviation of 1.33. The minimum and maximum scores indicate that students generally performed well in both competencies, with Analytical Skills ranging from 3 to 10 and Self-Reflection ranging from 4 to 10.

To further categorize the students' proficiency levels, the scores were classified into low (0-4), moderate (5-7), and high (8-10) categories. The percentage distribution of students in each category is presented in Table 3.

Level	Analytical Skills (%)	Self-Reflection (%)
Low (0-4)	10.0%	5.0%
Moderate (5-7)	35.0%	30.0%
High (8-10)	55.0%	65.0%

Table 3. Percentage Distribution of Analytical Skills and Self-Reflection Levels

Base on Table 3 indicate that 55% of students achieved a high level of Analytical Skills, while 65% demonstrated a high level of Self-Reflection. Meanwhile, only 10% of students scored in the low category for Analytical Skills, and 5% for Self-Reflection. These findings suggest that the SMART-Based Goal Free Evaluation approach effectively enhanced both competencies, with the majority of students exhibiting strong analytical thinking and self-reflective abilities.

Prerequisite Test Analysis

Before conducting further statistical analysis, a prerequisite test was performed to ensure that the data met the assumptions of normality and homogeneity. These tests are essential in determining the appropriate statistical approach for analyzing the effects of the SMART-Based Goal Free Evaluation (GFE) approach on analytical skills and self-reflection. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to assess whether the analytical skills and self-reflection scores followed a normal distribution. The results of the normality test are presented in Table 4.

Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Analytical Skills	0.087	60	0.094	0.976	60	0.123
Self-Reflection	0.079	60	0.071	0.982	60	0.108

Table 4. Normality Test Results

The results of Table 4 indicate that the significance values (Sig.) for both Kolmogorov-Smirnov and Shapiro-Wilk tests are greater than 0.05, meaning that both variables are normally distributed. This suggests that parametric statistical tests can be used for further analysis. The normal distribution of analytical skills and self-reflection scores indicates that the data collection was consistent and unbiased, making it reliable for hypothesis testing.

A Levene's Test for Equality of Variances was conducted to assess whether the variances between the experimental and control groups were homogeneous. The results are presented in Table 5.

Variable	Levene Statistic	df1	df2	Sig.
Analytical Skills	1.274	1	58	0.265
Self-Reflection	1.148	1	58	0.308

Table 5. Levene's Test of Homogeneity of Variances

Table 5 show that the significance values for both variables are greater than 0.05 (Sig. > 0.05), indicating that the data variances between groups are homogeneous. This confirms that the assumption of equal variance is met, allowing for further parametric statistical analysis, such as independent sample t-tests or MANOVA.

Hypothesis Test

To examine the influence of the SMART-Based Goal Free Evaluation Approach on students' analytical skills and self-reflection**,** a Multivariate Analysis of Variance (MANOVA) test was conducted. This test was chosen because there are two dependent variables **(**analytical skills and self-reflection**)** and one independent variable **(**evaluation approach: SMART-Based Goal Free Evaluation vs. Conventional Evaluation**).** Additionally, a partial analysis (univariate tests) was conducted to determine the individual effects of the treatment on each dependent variable.

MANOVA was conducted to test whether the SMART-Based Goal Free Evaluation Approach significantly affects students' analytical skills and self-reflection. The MANOVA test determines whether there is a significant difference between the experimental group **(**SMART-Based Goal Free Evaluation**)** and the control group (Conventional Evaluation**)** across the two dependent variables. The results of the hypothesis test are presented in Table 6**.**

Effect	**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**
Intercept	Pillai's Trace	0.980	2523.874b	2.000	78.000
	Wilks' Lambda	0.020	2523.874b	2.000	78.000
	Hotelling's Trace	49.231	2523.874b	2.000	78.000
	Roy's Largest Root	49.231	2523.874b	2.000	78.000
Group (Evaluation Approach)	Pillai's Trace	0.365	21.987b	2.000	78.000
	Wilks' Lambda	0.635	21.987b	2.000	78.000
	Hotelling's Trace	0.576	21.987b	2.000	78.000
	Roy's Largest Root	0.576	21.987b	2.000	78.000

Table 6. Results of MANOVA Hypothesis Test

Note: *$p < 0.05$ indicates statistical significance.*

Based on Table 6**,** the results of the Multivariate Tests indicate that the evaluation approach (SMART-Based Goal Free Evaluation vs. Conventional Evaluation) has a statistically significant effect on the combined dependent variables (analytical skills and self-reflection), as evidenced by the Wilks' Lambda value of 0.635, with an F-value of 21.987 and a significance level of p = 0.000**.** This means that the implementation of the SMART-Based Goal Free Evaluation Approach significantly enhances both students' analytical skills and self-reflection**.**

To determine the effect of the SMART-Based Goal Free Evaluation Approach on students' analytical skills and self-reflection, a partial test was conducted. The results are presented in Table 7.

Source	**Dependent Variable**	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**

Corrected Model	Analytical Skills	25.682a	1	25.682	19.874	0.000
	Self-Reflection	30.214b	1	30.214	24.765	0.000
Intercept	Analytical Skills	4521.671	1	4521.671	3496.543	0.000
	Self-Reflection	5108.214	1	5108.214	3987.432	0.000
Group (Evaluation Approach)	Analytical Skills	25.682	1	25.682	19.874	0.000
	Self-Reflection	30.214	1	30.214	24.765	0.000
Error	Analytical Skills	100.432	78	1.287		
	Self-Reflection	92.678	78	1.188		
Total	Analytical Skills	4647.785	80			
	Self-Reflection	5231.106	80			
Corrected Total	Analytical Skills	126.114	79			

Table 7. Partial Test Results

Note:

- *a. R Squared = 0.204 (Adjusted R Squared = 0.193)*
- *b. R Squared = 0.246 (Adjusted R Squared = 0.235)*

Based on Table 7, the results of the Tests of Between-Subjects Effects indicate that the evaluation approach (SMART-Based Goal Free Evaluation) has a statistically significant effect on both analytical skills and self-reflection. These findings suggest that the SMART-Based Goal Free Evaluation Approach effectively enhances both skills in students. The effect on self-reflection (24.6%) is slightly stronger than the effect on analytical skills (20.4%), indicating that the goal-free nature of the evaluation approach encourages deeper self-assessment and critical thinking.

Discussion

The results of this study indicate that the SMART-Based Goal Free Evaluation Approach has a significant effect on students' analytical skills and self-reflection. Based on the Multivariate Analysis of Variance (MANOVA) results, this evaluation approach has a statistically significant impact on both dependent variables, as evidenced by the Wilks' Lambda value of 0.635, F-value of 21.987, and p = 0.000. The partial test results further reveal that SMART-Based Goal Free Evaluation contributes more significantly to self-reflection (R Squared = 0.246) than to analytical skills (R Squared = 0.204). This finding suggests that students who undergo this evaluation method are more inclined to assess and reflect on their learning process rather than merely focusing on the final outcomes.

The Goal Free approach in evaluation allows students to think critically and understand concepts more flexibly without the pressure of specific targets. Unlike conventional evaluations, which are often goal-oriented and emphasize achieving a particular score, this method encourages students to focus on their thought processes and self-improvement. These findings support the theory that formative evaluation based on self-reflection can enhance students' metacognitive

awareness, enabling them to better understand their own thinking patterns in problem-solving and develop stronger analytical skills (Alawamleh et al., 2022; Kusumawardani et al., 2018).

Furthermore, the findings indicate that the effect of SMART-Based Goal Free Evaluation is more pronounced in self-reflection than in analytical skills, meaning that this method is particularly effective in helping students assess and understand their own cognitive processes. This has significant implications for education, as teachers and institutions can adopt this approach as a strategy to promote reflective learning and problem-solving skills. Thus, this study confirms that goal-free evaluation can be an effective tool for fostering critical thinking, self-reflection, and a deeper understanding of concepts, ultimately contributing to the overall improvement of educational quality.

Other research confirms the need for improvements in providing feedback in elementary schools by applying the SMART principle more consistently (Riddell, 2015). Professional development for teachers, diversification of methods, and timely and relevant feedback are key recommendations based on these findings. By addressing these barriers and strengthening the application of SMART principles, feedback is expected to be more effective in supporting student development and improving the quality of learning in elementary schools (Elmahdi et al., 2018; Riddell, 2015).

One of the main advantages of GFE is its ability to avoid the bias that often arises in evaluations that focus on a particular goal. Previous research has suggested that GFE allows evaluators to explore the impact and outcomes of a program more broadly without having to focus on whether a particular goal was achieved (Youker et al., 2014). However, without a clear structure, the results of the GFE can be too general or difficult to measure. This is where the SMART principle comes into play. By adding specific and measurable elements, the evaluation becomes more focused and the results can be compared or measured objectively. This supports research that underscores the importance of objectivity in evaluation to produce fairer and more comprehensive assessments (Kholis et al., 2020).

While GFE offers flexibility and freedom in evaluation, this approach can have limitations in terms of concrete measures of success. In the educational context, where measuring student performance and achievement is critical, the use of SMART principles becomes essential. The SMART principle helps in establishing a measurable and achievable evaluation framework, so that the evaluation results not only describe the broad impact but also provide recommendations that can be implemented. This is in accordance with findings that show that specific and measurable goals tend to improve performance because they provide clear guidance for individuals or organizations (Achmad et al., 2022; Sholihat & Amalia, 2019; Stovner & Klette, 2022).

In order to address the feedback problems, it is recommended to combine the Goal-Free Evaluation approach with the SMART principle (Specific, Measurable, Achievable, Relevant, Time-bound) to make feedback more objective, relevant, and measurable. This combination can help improve the effectiveness of feedback in elementary school settings by providing clear, actionable insights for both students and teachers. To improve the quality of feedback, training and professional development programs for teachers are essential. Teachers should be encouraged to adopt more varied and interactive feedback techniques, such as using technology or student reflection. The study's findings may not be universally applicable, as the context of elementary education differs across schools, regions, and countries. Future research should consider conducting similar studies in various educational environments to assess the broader

applicability of the findings. Many teachers face heavy workloads and time constraints, which limits their ability to implement the recommended feedback strategies. This limitation suggests that without structural changes, such as reducing teachers' administrative burdens or providing additional support, the application of these recommendations may be challenging.

Conclusion

The findings of this study confirm that the SMART-Based Goal Free Evaluation Approach has a significant positive impact on students' analytical skills and self-reflection. The MANOVA and partial test results demonstrate that this evaluation method effectively enhances students' ability to analyze information and critically assess their own learning process, with a stronger effect observed on self-reflection than analytical skills. By allowing students to engage in evaluation without predefined goals, this approach encourages deeper metacognitive awareness, critical thinking, and independent problem-solving. Compared to conventional evaluation methods, SMART-Based Goal Free Evaluation provides a more flexible and student-centered assessment, fostering a more meaningful and reflective learning experience. These findings highlight the potential of integrating goal-free evaluation strategies into educational practices to improve students' cognitive and reflective abilities, ultimately contributing to a more effective and holistic learning process.

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