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THE INFLUENCE OF THE SCL MODEL AND MIND MAPPING LEARNING MEDIA ON LEARNING OUTCOMES THROUGH MOTIVATION

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Abstract

This study aims to analyze the influence of the SCL model and Mind Mapping learning media on student learning outcomes in the IPAS subject through learning motivation. The background of this research is based on the low student achievement at MI Mambaul Ulum Karangduren, which is caused by limited learning independency and low motivation. The SCL model is considered capable of encouraging student activeness and independency during the learning process, while Mind Mapping, as a visual learning medium, is expected to enhance concept understanding and learning interest. This study employed a quantitative approach. The population in this study was 75 fourth-grade students at MI Mambaul Ulum Karangduren for the 2024/2025 academic year, with a sample of 35 students. The data analysis technique used in this research included classical assumption testing, and hypothesis testing using path analysis to determine direct, indirect, and total effects among the variables. The results showed that both the SCL model and Mind Mapping media had a significant influence on learning motivation, which in turn affected the learning outcomes. Furthermore, there was an indirect effect of the SCL model on learning outcomes through motivation, but no indirect effect was found for the Mind Mapping media through motivation. Therefore, there is a total effect of the SCL model and Mind Mapping media on learning outcomes through learning motivation. These findings confirm that the combination of a student-centered learning model and engaging visual media can effectively improve student motivation and academic performance. However, this study is limited by its specific geographical scope at a single institution and does not measure the long-term effectiveness of these models beyond the current academic term.

Keywords: SCL model, Mind Mapping, Learning Outcomes, Learning Motivation, IPAS

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INTRODUCTION | مقدمة

In the 21st century, education is viewed as a "never-ending process" aimed at developing high-quality individuals with competencies rooted in national cultural values (Sujana, 2019). Student success is shaped through a structured educational process where key components—students, educators, curriculum, and media—must interact effectively to achieve successful learning outcomes (Bustami et al., 2023; Nurhidayah et al., 2023). Consequently, learning outcomes serve as the primary benchmark for educational success, reflecting behavioral changes across affective, cognitive, and psychomotor domains (Purwanto, 2016; Ulimaz, 2019).

However, observations conducted in Grade IV at MI Mambaul Ulum Karangduren reveal that student learning outcomes in the Science and Social Studies (IPAS) subject remain unsatisfactory and fail to meet the Learning Objective Achievement Criteria (KKTP). This low performance is driven by a lack of independence and learning motivation, as students rely heavily

on teacher explanations rather than exploring diverse information sources. To address this issue, the Student-Centered Learning (SCL) model and Mind Mapping media are proposed as strategic solutions.

Theoretically, the SCL model aligns with Self-Determination Theory (SDT), which posits that intrinsic motivation flourishes when students' needs for autonomy and competence are met (Ryan & Deci, 2017). By placing students at the heart of the learning process, SCL transforms them from passive receivers into active knowledge managers (Wina Sanjaya, 2020). Complementing this, Mind Mapping serves as a visual tool that facilitates information organization. This is supported by Dual Coding Theory, which suggests that cognitive processing is optimized when verbal and visual information are integrated, thereby enhancing memory retention and conceptual understanding (Buzan, 2021; Clark & Paivio, 1991).

Despite the extensive research on SCL and Mind Mapping individually (Mulyadi et al., 2022; Jiang & Zhang, 2020), a significant research gap remains. Most existing studies focus on the direct impact of these methods on achievement without explicitly examining the psychological mechanisms that bridge them. Specifically, empirical evidence regarding the mediating role of learning motivation in the relationship between the SCL-Mind Mapping combination and learning outcomes in elementary IPAS subjects is still very limited. While SCL encourages participation and Mind Mapping aids visualization, it is the internal drive—motivation—that ultimately determines the sustainability of these academic gains (Widiasih et al., 2017; Sutrisno, 2016).

Therefore, this study aims to fill this gap by analyzing the influence of the SCL model and Mind Mapping media on learning outcomes through learning motivation as a mediating variable at MI Mambaul Ulum Karangduren. This research integrates SDT and Dual Coding perspectives to provide a comprehensive framework for improving educational quality. The research questions are: (1) Does the SCL model influence student motivation and learning outcomes? (2) Does Mind Mapping media influence student motivation and learning outcomes? and (3) Does learning motivation serve as a mediating factor between the SCL model and Mind Mapping media toward student learning outcomes?

METHOD | منهج

This study employs a quantitative approach to analyze the influence of the Student-Centered Learning (SCL) model (X_1) and Mind Mapping media (X_2) on learning outcomes (Y), with learning motivation serving as an intervening variable (Z). The quantitative method was selected to facilitate an objective analysis of inter-variable relationships using statistical data (Sugiyono, 2022).

The research was conducted at MI Mambaul Ulum Karangduren, Pakisaji. The population consisted of 75 fourth-grade students during the even semester of the 2024–2025 academic year. From this population, a sample of 35 students was selected using a purposive sampling technique. This technique was applied based on specific criteria, namely students in classes that had fully implemented the SCL model and Mind Mapping media during IPAS instruction, ensuring that the sample was representative of the variables being studied.

Data collection was carried out through triangulation of sources to ensure a holistic measurement of student achievement. Learning motivation was measured using a Likert-scale questionnaire, while student learning outcomes (Y) were assessed not only through report card documentation (cognitive domain) but also through direct observation and objective tests

conducted after the learning sessions. This approach was taken to capture a more comprehensive view of student competence, including affective and psychomotor aspects, rather than relying solely on administrative grades.

Instrument quality was ensured through validity and reliability testing. Validity testing using Pearson Product Moment confirmed that all items were valid, while Cronbach's Alpha reliability results exceeded 0.70, indicating high instrument reliability. Prior to the main analysis, the data underwent classical assumption tests—including normality, multicollinearity, heteroscedasticity, and autocorrelation—to ensure the regression model met the Best Linear Unbiased Estimator (BLUE) criteria (Santoso, 2019).

Finally, the data were analyzed using multiple linear regression and path analysis (Ghozali, 2021). Path analysis was specifically utilized to identify complex causal relationships and to calculate the direct and indirect effects of the SCL model and Mind Mapping media on learning outcomes through learning motivation.

RESULT | نتائج

The research data description is presented to provide a general overview of the data distribution collected in the field. These data were gathered by distributing questionnaires to 75 students of class IV (four) at MI Mambaul Ulum, Karangduren-Pakisaji, who served as the research sample.

Table 1. Distribution of Report Card Grades as the Learning Outcomes Variable (Y).

Category	Excellent		Good		Enough		Less		Very Less		Average
Value	85-100		73-84		60-72		45-59		0-44		Σ
Frequency	39	52%	36	48%	0	0	0	0	0	0	86,64

The learning motivation variable was measured using 16 questionnaire items. The results indicate that 72% of respondents provided positive responses (strongly agree and agree), suggesting that the students' level of learning motivation is categorized as good. This finding is supported by an overall mean score of 3.59, reflecting high student motivation during the learning process. Specifically, the highest score of 3.97 was recorded for the statement regarding task persistence: "I always try to work on an assignment until it is successful." Conversely, the lowest score of 2.91 was found for the statement "I enjoy solving complex Science and Social Studies (IPAS) problems," indicating variations in persistence and interest toward challenging academic tasks.

Table 2. Mean Distribution of Learning Motivation Questionnaire Responses.

Question Number	Excellent		Good		Enough		Less		Very Less		Average
(Y)	F	%	F	%	F	%	F	%	F	%	Σ
1	14	18.7	44	58.7	11	14.7	3	4	3	4	3.84
2	8	10.7	32	42.7	23	30.7	10	13.3	2	2,7	3.45
3	13	17.3	45	60.0	17	22.7	0	0	0	0	3.95
4	17	22.7	43	57.3	12	16.0	2	2.7	1	1.3	3.97
5	18	24.0	37	49.3	17	22.7	1	1.3	2	2.7	3.91
6	11	14.7	28	37.3	31	41.3	3	4.0	2	2.7	3.57
7	22	29.3	33	44.0	14	18.7	4	5.3	2	2.7	3.92
8	11	14.7	33	44.0	24	32.0	1	1.3	6	8.0	3.56
9	12	16.0	29	38.7	20	26.7	11	14.7	3	4.0	3.48
10	12	16.0	37	49.3	21	28.0	1	1.3	4	5.3	3.69
11	13	17.3	23	30.7	27	36.0	10	13.3	2	2.7	3.47
12	15	20.0	26	34.7	25	33.3	6	8.0	3	4.0	3.59
13	7	9.3	31	41.3	34	45.3	2	2.7	1	1.3	3.55
14	13	17.3	34	45.3	18	24.0	6	8.0	4	5.3	3.61
15	6	8.0	21	28.0	26	34.7	9	12.0	13	17.3	2.97

Question Number	Excellent		Good		Enough		Less		Very Less		Average
(Y)	F	%	F	%	F	%	F	%	F	%	Σ
16	4	5.3	22	29.3	26	34.7	9	12.0	14	18.7	2.91
Quantity	196		518		346		78		62		
Average		16.3		43.2		28.8		6.5		5.2	3.59

Based on the analysis results in Table 2, it was found that 69.74% of respondents expressed positive feedback (strongly agree and agree) regarding the implementation of the Student-Centered Learning (SCL) model. An average score of 3.90 further signifies a favorable response to this model. The statement with the highest level of approval pertained to the use of electronic learning media, such as PowerPoint (73.3%), which is perceived to enhance student motivation and learning outcomes. However, the lowest mean score (3.59) indicates that some students still lack the confidence to express their opinions in class. This suggests a need for further encouragement to foster more active participation in classroom discussions.

Tabel.3 Distribution of Average Scores for the Learning Model Variables.

Question Number	Excellent		Good		Enough		Less		Very Less		Average
(Y)	F	%	F	%	F	%	F	%	F	%	Σ
1	10	36	38	50.7	27	13.3	0	0	0	0	3.77
2	17	22.7	19	25.3	31	41.3	7	9.3	1	1.3	3.59
3	24	32.0	34	45.3	16	21.3	1	1.3	0	0	4.08
4	11	14.7	35	46.7	27	36.0	1	1.3	1	1.3	3.72
5	23	30.7	32	42.7	16	21.3	4	5.3	0	0	3.99
6	20	26.7	32	42.7	22	29.3	0	0	1	1.3	3.93
7	42	56.0	13	17.3	16	21.3	4	5.3	0	0	4.24
8	31	41.3	24	32.0	19	25.3	1	1.3	0	0	4.13
9	15	20.0	39	52.0	19	25.3	2	2.7	0	0	3.89
10	12	16.0	35	46.7	21	28.0	5	6.7	2	2.7	3.67
Quantity	205		301		214		25		5		
Average		29.6		40.14		28.51		3.32		0.66	3.90

Based on the analysis presented in Table 3, it was found that 69.74% of respondents expressed positive feedback—represented by "strongly agree" and "agree" ratings—regarding the implementation of the Student-Centered Learning (SCL) model. An overall mean score of 3.90 further underscores a favorable reception of this instructional approach. The highest level of agreement was observed in the utilization of electronic learning media, such as PowerPoint (73.3%), which is perceived as effective in enhancing student motivation and academic achievement. Conversely, the lowest mean score (3.59) indicates that a segment of the student population still lacks confidence in expressing their opinions within the classroom. Consequently, more intentional efforts are required to encourage active participation during discussions.

Table 4. Mean Scores Distribution for Mind Mapping Media Items.

Question Number	Excellent		Good		Enough		Less		Very Less		Average
(Y)	F	%	F	%	F	Σ	F	%	F	%	Σ
1	22	29.3	44	58.7	9	12.0	0	0	0	0	4.17
2	39	52.0	27	36.0	9	12.0	0	0	0	0	4.04
3	22	29.3	32	42.7	17	22.7	2	2.7	2	2.7	3.20
4	42	56.0	28	37.3	5	6.7	0	0	0	0	4.29
5	32	42.7	29	38.7	14	18.7	0	0	0	0	3.68
6	39	52.0	25	33.3	11	14.7	0	0	0	0	3.93
7	41	54.7	24	32.0	6	8.0	3	4.0	1	1.3	4.03
8	33	44.0	31	41.3	9	12.0	2	2.7	0	0	3.85
9	35	46.7	31	41.3	9	12.0	0	0	0	0	3.99
10	31	41.3	31	41.3	13	17.3	0	0	0	0	3.72
11	34	45.3	17	22.7	18	24.0	6	8.0	0	0	3.17
12	26	34.7	26	34.7	20	26.7	2	2.7	1	1.3	3.13

13	36	48.0	29	38.7	9	12.0	1	1.3	0	0	3.39
14	40	53.3	26	34.7	8	10.7	1	1.3	0	0	4.05
Quantity	472		400		157		17		4		
Average		45.0		38.1		15.0		1.6		0.4	3.80

The collected data reveal that the item "Core sentences in the concept map make it easier for me to read IPAS material" yielded positive results. The inclusion of key sentences during the initial stages of concept mapping significantly facilitates students' understanding of the subject matter. This leads to a more enjoyable learning experience and bolsters student motivation in IPAS lessons, which ultimately contributes to improved learning outcomes. In contrast, the item "Different lines make it easier for my teacher to create concept maps" received the lowest score. This finding suggests that while varied line patterns may simplify the creation process for teachers, they may conversely create confusion for students in interpreting the map's flow. Therefore, it is recommended that the line structures in teacher-made concept maps be designed more intuitively to ensure better readability and comprehension for students.

Table 5. Summary of Classical Assumption Test Results

No	*Classical Assumption Test*	Result	Description
1	**Normality Test**	Shows that the residual points are distributed along the normal diagonal line, indicating that the data are normally distributed	The residual distribution fulfills the criteria for normality.
2	Multicollinearity Tes	Reveals VIF values of 2.006 for the SCL Learning Model, 2.416 for the Mind Mapping Media, and 1.792 for Motivation. Since all VIF values are below the threshold of 5, it is confirmed that there is no perfect correlation between the independent variables, signifying the absence of multicollinearity.	No multicollinearity was detected. multikolinieritas
3	Heteroscedasticity Test	Demonstrates that the residual scatter plot does not form any specific pattern, which indicates that heteroscedasticity has not occurred.	No multicollinearity was detected. Heteroskedastisitas
4	Autocorrelation Test	Show a Durbin-Watson value of 1.696 with a significance value of 0.000 (< 0.05), concluding that there is no autocorrelation in the model. Consequently, the regression model fulfills the **BLUE** (*Best Linear Unbiased Estimator*) requirements and is considered valid for further statistical analysis.	No multicollinearity was detected. autokorelasi

Based on the results presented in Table 5, it can be concluded that the regression model has fulfilled all classical assumption tests. The data indicate that the residuals are normally distributed and that the model is free from issues of multicollinearity and heteroscedasticity. Furthermore, no evidence of autocorrelation was detected. Consequently, the regression model is deemed valid and appropriate for further statistical analysis.

Table 6. Path Analysis I: Results of Multiple Linear Regression Analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	27.928	.643		43.421	.000
	Model SCL	.338	.034	.479	9.805	.000
	Media *Mind Mapping*	.327	.030	.525	10.755	.000

a. Dependent Variable: Motivasion

Based on the results of the multiple linear regression analysis, the following structural equation was obtained: Z = 27.928 + 0.479 (X1) + 0.525 (X2). This equation demonstrates a positive relationship between the Student-Centered Learning (SCL) model and Mind Mapping instructional media regarding learning motivation. The constant value of 27.928 indicates the baseline level of motivation when both independent variables are held at zero. Furthermore, the regression

coefficients of 0.479 for the SCL model and 0.525 for Mind Mapping media imply that every one-unit increase in these variables will result in a corresponding increase in student motivation by 0.479 and 0.525, respectively.

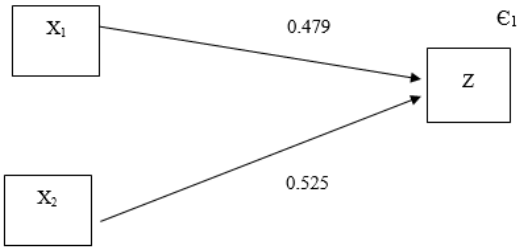

Figure 1. Sub-Structure I: Path Diagram of X1 and X2 on Z

The findings reveal a significant difference in how variables influence learning outcomes. While SCL influences outcomes indirectly through motivation, Mind Mapping exerts a direct cognitive influence. This suggests that Mind Mapping works as a visual tool that directly simplifies complex IPAS material for students' brains, making the role of motivation less critical compared to the SCL model. The path analysis results demonstrate that the independent variables have a significant impact on the intervening variable. Specifically, Mind Mapping Instructional Media (X2) exerts a greater influence on Motivation (Z) compared to the SCL Learning Model (X1), as indicated by their respective path coefficients (0.525 > 0.479). Given the significance value of 0.000 (< 0.05), it can be concluded that both independent variables (X1 and X2) partially and significantly affect student learning motivation.

Table 7. Multiple Linear Regression for Path Analysis Model II

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	32.637	3.469		9.408	.000
	Model SCL	.052	.024	.101	2.117	.038
	Media *Mind Mapping*	.425	.169	.376	2.521	.014
	Motivation	.546	.149	.546	3.652	.000

a. Dependent Variable: Academic Achievement

Based on the multiple linear regression calculations for the second sub-structure, the resulting equation is as follows

$$Y = 32.637 + 0.101X1 + 0.376X2 + 0.546Z$$

The results indicate that the SCL learning model, Mind Mapping media, and student motivation exert a positive influence on learning outcomes. A constant value of 32.637 represents the baseline level of learning outcomes when the three independent variables are held constant at zero. Furthermore, the regression coefficients reveal that every one-unit increase in the SCL model, Mind Mapping media, and motivation leads to an increase in learning outcomes by 0.101, 0.376, and 0.546, respectively. This reflects a positive and unidirectional relationship among the variables. The structural model for the second stage of path analysis is illustrated in Picrute 2 below:

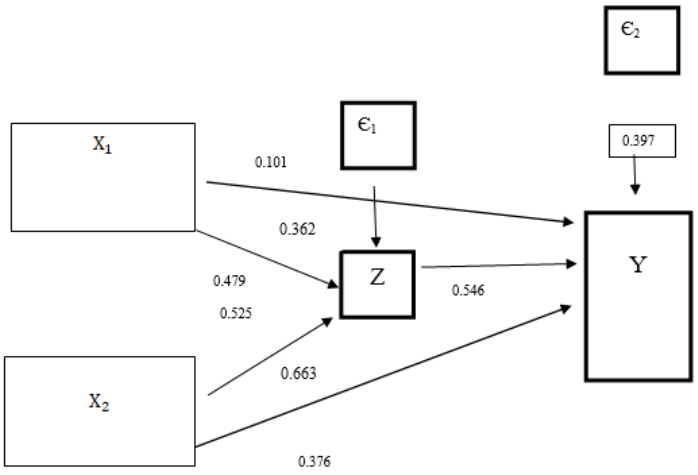

Figure 2. Sub-Structure II: Path Diagram of X1, X2, and Z on Y

The analysis results in Figure 2 demonstrate that the independent variables influence the dependent variable both directly and through an intervening variable. The SCL Learning Model (X1) exerts the smallest direct effect on Learning Outcomes (Y) compared to Mind Mapping Media (X2) and Motivation (Z), with path coefficients ranked at 0.052 < 0.425 < 0.546, respectively. Significance values (X1=0.038, X2=0.014, Z=0.000) confirm that all three variables have a significant impact. An R-Square value of 0.842 indicates that these variables collectively contribute 84.2% to the variance in learning outcomes, while the remaining 15.8% is influenced by factors outside this study.

Path analysis demonstrates both direct and indirect effects among the Student-Centered Learning (SCL) Model, Mind Mapping Media, Learning Motivation, and Learning Outcomes. Regarding the direct effects, all variables yielded significance values of less than 0.05, indicating that each variable exerts a significant partial influence. Specifically, the SCL Model (X1) significantly affects Learning Motivation (Z) and Learning Outcomes (Y), with significance values of 0.000 and 0.038, respectively. Similarly, Mind Mapping Media (X2) also shows a significant impact on Learning Motivation (Z) and Learning Outcomes (Y), with significance levels of 0.000 and 0.014. Furthermore, Learning Motivation (Z) itself maintains a highly significant direct effect on Learning Outcomes (Y), as evidenced by a significance value of 0.000.

In the analysis of indirect effects, a distinction was observed in the mediating role of the variables. The influence of the SCL Learning Model (X1) on Learning Outcomes (Y) through Learning Motivation (Z) yielded a direct effect value of 0.101 and an indirect effect of 0.261. Given that the indirect effect is greater than the direct effect (0.261 > 0.101), it is evident that Learning Motivation serves as a significant mediating variable in this relationship.

In contrast, regarding Mind Mapping Media (X2), the direct effect on Learning Outcomes (Y) was 0.376, while the indirect effect through Learning Motivation (Z) was only 0.287. Since the direct effect exceeds the indirect effect (0.376 > 0.287), it can be concluded that Learning Motivation does not act as a mediator in the relationship between Mind Mapping Media and Learning Outcomes.

Total effect, the SCL Learning Model exerts a cumulative influence of 0.362 on Learning Outcomes, calculated from the sum of its direct effect (0.101) and indirect effect (0.261). Meanwhile, Mind Mapping Media provides a more substantial total effect of 0.663, resulting from the combination of its direct (0.376) and indirect effects (0.287). Consequently, it can be concluded

that while both instructional approaches significantly impact learning outcomes, their mechanisms of influence differ; the SCL model relies more heavily on the role of learning motivation as an intervening variable, whereas Mind Mapping demonstrates a more dominant direct effect. Mind Mapping serves as a more dominant predictor for learning outcomes in IPAS compared to the SCL model. This implies that visual representation of concepts is more effective for fourth-grade students at MI Mambaul Ulum Karangduren than the instructional model itself.

DISCUSSION | مناقشة

The research findings indicate that the implementation of the Student-Centered Learning (SCL) model significantly enhances student learning motivation at MI Mambaul Ulum Karangduren. By shifting the focus from the teacher to the student, SCL satisfies the basic psychological needs for autonomy and competence, which are central to Self-Determination Theory (SDT) (Deci & Ryan, 2020). When students feel they have control over their learning process, their intrinsic motivation naturally increases. However, during the study, a "reality gap" was observed where several students still appeared hesitant to express opinions. This suggests a tension between the idealism of SCL and the reality of the classroom; students who are accustomed to teacher-centered instructions require a longer adaptation period to feel safe and confident in a collaborative environment.

A pivotal discovery in this study is the differing mechanisms through which SCL and Mind Mapping influence learning outcomes. The path analysis reveals that learning motivation significantly mediates the relationship between the SCL model and learning outcomes. This confirms that SCL operates through an affective-social pathway. SCL does not improve grades directly through the method alone, but rather by first boosting the student's sense of responsibility and engagement (Brown, 2020). Without a high level of motivation, the SCL model’s impact on academic achievement remains limited.

In contrast, the indirect effect of Mind Mapping on learning outcomes via motivation was found to be non-significant, despite it having the most dominant total effect (0.663). This findng highlights that Mind Mapping operates primarily through a direct cognitive-visual pathway. Supported by Dual Coding Theory, Mind Mapping integrates verbal and visual information, which aligns perfectly with how the human brain processes and stores data (Clark & Paivio, 1991). Consequently, Mind Mapping is so effective at simplifying complex IPAS material that it can improve student grades directly by reducing cognitive load, regardless of whether the student's motivation level has significantly shifted.

Practical Implications and Recommendations

The dominance of Mind Mapping over the SCL model in this context provides critical insights for educational policy at MI Mambaul Ulum Karangduren:

1. Prioritizing Visual Literacy: Given that Mind Mapping is the strongest predictor of success, the school should prioritize teacher training in "Visual Literacy." Teachers need to be skilled in designing and using visual aids to help students map out complex concepts before engaging in discussions.
2. Strategic Integration: To overcome the "hesitancy" in SCL, teachers should use Mind Mapping as a "pre-structural" tool. By creating a visual map first, students gain the conceptual confidence needed to participate more actively in SCL-based group work.

3. Flexible Resource Allocation: The school administration should consider allocating more time and resources for the development of interactive media. Since Mind Mapping works directly on the cognitive side, its integration into digital learning platforms could further accelerate student mastery of the IPAS curriculum.

CONCLUSSION | خاتمة

Based This study concludes that the Student-Centered Learning (SCL) model and Mind Mapping media play strategic and distinct roles in enhancing student motivation and learning outcomes at MI Mambaul Ulum Karangduren. The implementation of SCL effectively fosters student independence and autonomy, which in turn triggers intrinsic motivation as a vital mediator for academic achievement. This emphasizes that student engagement is indeed the cornerstone of successful student-centered instruction.

Conversely, Mind Mapping media demonstrates a more dominant direct effect on learning outcomes by providing a systematic visual presentation of materials. Interestingly, its indirect effect through motivation was found to be non-significant, suggesting that Mind Mapping operates through a direct cognitive-visual pathway. Theoretically, this finding extends the current understanding of instructional design by demonstrating that visual tools like Mind Mapping can operate independently of motivation. This challenges the common pedagogical assumption that all instructional interventions must pass through an affective pathway to be effective. Overall, the integration of the process-oriented SCL model and the cognitive-oriented Mind Mapping creates a comprehensive learning ecosystem that empowers student potential. Future research is encouraged to explore these pathways across different subjects and to integrate digital-based Mind Mapping tools to further examine their long-term impact on cognitive retention.

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