



Self-Regulation Based Time Management And Innovative Behavior Among Senior High School Students In Medan City

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Abstract: This study examined the association between self-regulation-based time management and innovative behavior among senior high school students in Medan City, Indonesia. A quantitative correlational design was applied to a sample of 250 Grade XI students from public and private schools selected using cluster random sampling. Self-report measures assessed self-regulation-based time management (goal setting, planning, self-monitoring, and adaptive adjustment) and innovative behavior in learning contexts (idea generation, idea promotion, and idea implementation). Both instruments demonstrated satisfactory internal consistency (Cronbach's $\alpha = 0.88$ and 0.86 , respectively). Pearson correlation analysis indicated a moderate positive relationship between self-regulation-based time management and innovative behavior ($r = 0.53$, $p < 0.01$). Linear regression analysis further showed that time management significantly predicted innovative behavior, explaining 28% of the variance ($R^2 = 0.28$, $p < 0.001$). These findings indicate that higher levels of self-regulatory time management are associated with greater engagement in innovation-oriented learning behaviors. The results underscore the role of self-regulatory resources in facilitating students' innovative actions within academic settings. Interventions aimed at strengthening planning, monitoring, and adaptive time management strategies may be effective in promoting innovative behavior among adolescents. Future research should employ longitudinal and multilevel designs to examine causal mechanisms and contextual influences.

Keywords: Innovative Behavior, Self-Regulation, Time Management, Senior High School Students, Indonesia

Introduction

Twenty-first-century education increasingly positions innovative behavior as a key competency that students need to develop. In educational settings, innovative behavior refers to students' capacity to generate new ideas, experiment with different learning strategies, and apply creative solutions to academic problems. These capabilities are widely considered integral to twenty-first-century learning competencies that emphasize creativity, critical thinking, and adaptability in response to change (Beghetto & Kaufman, 2014) (OECD, 2018). Accordingly, fostering innovative behavior among senior high school students has become a strategic priority for improving educational quality. However, innovative behavior does not emerge spontaneously (rather, it is shaped by a range of

psychological and environmental factors. Prior research has indicated that academic pressure, heavy task demands, and limited time availability often constitute major barriers that prevent students from engaging in creative and innovative activities (Leana & Barry, 2000) (Zhou & Hoever, 2014). Under such conditions, students tend to prioritize routine task completion over idea exploration, which may hinder the development of their innovative potential.

One psychological factor that plays an important role in coping with academic demands is time management. Traditionally, time management has been understood as a technical skill related to scheduling and organizing activities. Nevertheless, this perspective may not sufficiently explain individual differences in the effectiveness of time use. Claessens et al., (2007) argued that time management cannot be separated from internal psychological processes that guide how individuals set priorities, make decisions, and regulate their behavior in allocating time. Within educational psychology, time management is increasingly conceptualized as part of self-regulation. Self-regulation refers to individuals' ability to set goals, plan actions, monitor progress, and adjust behavior to achieve desired outcomes (Zimmerman, 2000) (Zimmerman & Schunk, 2011). Pintrich, (2000) conceptualized self-regulated learning as an active and constructive process in which students set learning goals, monitor their progress, and regulate cognition, motivation, and behavior to achieve academic outcomes. Within this framework, effective regulation of time represents a core mechanism that supports adaptive learning behaviors. Recent evidence further suggests that self-regulation is a robust predictor of academic success, learning motivation, and student engagement in the learning process (Dent & Koenka, 2016) (Panadero, 2017).

Self-regulation based time management emphasizes that time use is the result of conscious and reflective processes involving planning, self-monitoring, and ongoing evaluation. Students with stronger self-regulatory skills tend to allocate time more effectively, reduce academic procrastination, and maintain focus on long-term goals (Wolters & Brady, 2021). This condition supports the availability of cognitive and emotional resources required for creative thinking and for experimenting with innovative learning approaches. Consistent with this perspective, theories of innovative behavior suggest that innovation at the individual level requires personal initiative, cognitive flexibility, and the willingness to adopt novel approaches in completing tasks (De Jong & Den Hartog, 2010) (Scott & Bruce, 1994) In student populations, innovative behavior may be reflected in the confidence to express ideas, the use of alternative learning strategies, and the ability to integrate knowledge creatively. Self-regulation in time management is therefore assumed to function as a psychological mechanism that facilitates these behaviors.

Although the relationship between self-regulation and various educational outcomes has been extensively studied, research specifically linking self-regulation based time management to innovative behavior among senior high school students remains relatively limited, particularly in the Indonesian educational context. This gap is important because cultural factors, school environments, and local educational dynamics may influence how

students manage their time and express innovation (Hofmann, Baumeister, et al., 2012). Therefore, more contextualized empirical research is needed.

Medan City, as one of the major urban areas in Indonesia, represents a heterogeneous educational context in terms of students' social backgrounds, school types, and academic demands. Steel, (2007) argued that poor time regulation is closely associated with procrastination, which often results in increased time pressure and reduced cognitive engagement. According to Zacks & Hasher (1994), effective cognitive functioning depends on attentional control and the ability to inhibit irrelevant stimuli. Goal-setting theory proposes that clear and challenging goals enhance motivation, persistence, and task engagement, particularly when individuals actively regulate their progress toward these goals (Locke & Latham, 2002).

Time management plays a central role in translating goal intentions into sustained, innovation-oriented learning behaviors. Sweller, (1988) cognitive load theory suggests that learning effectiveness decreases when cognitive resources are overwhelmed by excessive demands. Effective time management can reduce extraneous cognitive load, allowing students to allocate mental resources toward higher-order processes such as creative thinking and innovation. Excessive time pressure and poor time management may impair these inhibitory processes, reducing students' capacity for creative and innovative thinking. Under such conditions, students tend to focus on task completion rather than exploring novel ideas, thereby limiting innovative behavior. Under such conditions, students tend to focus on task completion rather than exploring novel ideas, thereby limiting innovative behavior. The urban environment characterized by high activity intensity and academic competition makes senior high school students in Medan a relevant population for examining the association between self-regulation based time management and innovative behavior. Understanding this relationship is expected to provide empirical contributions to the development of instructional strategies and school counseling services aimed at strengthening students' self-regulation and innovation. Based on these theoretical and empirical considerations, this study investigates the relationship between self-regulation based time management and innovative behavior among senior high school students in Medan City.

Methodology

This study employed a quantitative approach with a correlational design to examine the relationship between self-regulation based time management and innovative behavior among senior high school students in Medan City, Indonesia. A correlational design was considered appropriate because the study did not aim to manipulate variables, but rather to investigate the natural association between psychological constructs as they occur in an educational context. This approach is widely used to explain relationships between psychological variables within adolescent student populations. The participants were Grade XI students from public and private senior high schools in Medan City. Grade XI was selected based on developmental and academic considerations, as students at this level typically have passed the initial adjustment period of high school and have not yet

experienced the intense academic pressure associated with graduation examinations. Steel, (2007) argued that poor time regulation is closely associated with procrastination, which often results in increased time pressure and reduced cognitive engagement. Under such conditions, students tend to focus on task completion rather than exploring novel ideas, thereby limiting innovative behavior. The sample was obtained using cluster random sampling. In the first stage, schools were randomly selected from the pool of public and private senior high schools, after which Grade XI classes within selected schools were treated as clusters. All students in the selected classes were invited to participate as respondents. The final sample consisted of 250 students, which was considered adequate for correlational analysis and consistent with recommended sample sizes in educational psychology research.

Self-regulation based time management was measured using a scale developed from the self-regulation framework, emphasizing goal setting, time planning, self-monitoring, and adaptive strategy adjustment in managing learning activities. This scale was designed to capture the extent to which students intentionally regulate their learning time in line with academic goals. Innovative behavior was assessed using a scale based on the concept of individual innovative behavior, including students' tendencies to generate new ideas, express suggestions, and apply creative approaches within learning activities. Both instruments were presented as closed-ended statements rated on a five-point Likert scale, with higher scores indicating higher levels of self-regulation based time management and innovative behavior. Data collection was conducted in school settings after obtaining institutional permission and participant consent. Prior to completing the questionnaire, students received a clear explanation of the study objectives, confidentiality procedures, and the voluntary nature of participation. The collected data were analyzed using statistical software. Data analysis began with descriptive statistics to summarize the characteristics of the study variables, followed by reliability testing to evaluate internal consistency. Pearson correlation analysis was then performed to test the relationship between self-regulation based time management and innovative behavior. The entire research process was conducted in accordance with ethical principles, particularly informed consent and the protection of participant confidentiality.

Result and Discussion

Participant Characteristics

This study involved 250 Grade XI students from public and private senior high schools in Medan City. The distribution of participants by gender, academic track, and school type is presented in Table 1.

Table 1. Participant Characteristics (N = 250)

Characteristic	Category	n	%
Gender	Male	112	44.8
	Female	138	55.2
Academic track	Science (IPA)	143	57.2

Characteristic	Category	n	%
	Social Science (IPS)	107	42.8
School type	Public	132	52.8
	Private	118	47.2

As shown in Table 1, the sample was dominated by female students (55.2%). The proportion of students in the Science track was slightly higher than those in Social Science, and the representation of public and private schools was relatively balanced.

Descriptive Statistics

Descriptive analyses were conducted to summarize the levels of self-regulation based time management and innovative behavior among students. The results are presented in Table 2.

Table 2. Descriptive Statistics of Study Variables

Variable	N	Min	Max	Mean	SD
Self-regulation based time management	250	2.10	4.85	3.62	0.54
Innovative behavior	250	2.05	4.90	3.58	0.57

The findings indicate that the mean score for self-regulation based time management was in the moderate-to-high range ($M = 3.62$, $SD = 0.54$), suggesting that most students were reasonably capable of managing their learning time in a purposeful manner (e.g., setting priorities and planning learning activities). Similarly, innovative behavior was also within the moderate-to-high range ($M = 3.58$, $SD = 0.57$), indicating that students frequently demonstrated innovative behaviors such as adopting new learning strategies, expressing ideas during classroom discussions, or using creative approaches to complete assignments.

Instrument Reliability

Reliability testing was conducted to evaluate the internal consistency of the instruments used in this study. A Cronbach’s alpha value ≥ 0.70 is commonly considered acceptable, whereas values ≥ 0.80 indicate good reliability.

Table 3. Reliability of Research Instruments

Variable	Number of items	Cronbach’s Alpha
Self-regulation based time management	24	0.88
Innovative behavior	18	0.86

As presented in Table 3, both instruments yielded Cronbach’s alpha values above 0.80, indicating good reliability and supporting their suitability for further correlational analyses.

Assumption Testing (Normality and Linearity)

Prior to conducting correlation and regression analyses, assumption testing was performed. Normality was assessed using skewness and kurtosis indices to determine whether the distribution of data fell within acceptable ranges.

Table 4. Normality Indicators

Variable	Skewness	Kurtosis
Self-regulation based time management	-0.41	0.62
Innovative behavior	-0.35	0.58

The skewness and kurtosis values for both variables were within acceptable limits, indicating that the data were suitable for parametric analyses. Linearity was also examined to ensure that the relationship between variables followed a linear pattern.

Table 5. Linearity Test

Variable relationship	F (Deviation from linearity)	p
Self-regulation based time management → Innovative behavior	1.12	0.31

The p-value greater than 0.05 indicates that the deviation from linearity was not significant, suggesting that the relationship between self-regulation based time management and innovative behavior can be considered linear and thus meets the assumptions for Pearson correlation and linear regression analyses.

Pearson Correlation Analysis

Pearson correlation analysis was conducted to examine the relationship between self-regulation based time management and innovative behavior.

Table 6. Pearson Correlations Between Variables

Variable	1	2
1. Self-regulation based time management	1.00	0.53**
2. Innovative behavior	0.53**	1.00

Note. **p < 0.01.

The results showed a positive and statistically significant association between self-regulation based time management and innovative behavior ($r = 0.53$, $p < 0.01$). This correlation falls within the moderate-to-strong range, indicating that students who managed their time in a more structured and reflective manner tended to report higher innovative behavior.

To strengthen the interpretation, a 95% confidence interval was calculated for the correlation coefficient.

Table 7. 95% Confidence Interval for the Correlation

r	95% CI (Lower)	95% CI (Upper)
0.53	0.43	0.61

The confidence interval indicates that the correlation coefficient ranged from 0.43 to 0.61, suggesting that the positive relationship between the variables was stable and unlikely to occur by chance.

Simple Linear Regression Analysis

A simple linear regression analysis was conducted to determine the extent to which self-regulation based time management predicted innovative behavior.

Table 8. Model Summary of Simple Linear Regression

Model	R	R ²	Adjusted R ²	SEE
1	0.53	0.28	0.28	0.49

The regression results indicated that self-regulation based time management explained 28% of the variance in innovative behavior ($R^2 = 0.28$). In other words, students' ability to regulate their time contributed meaningfully to their innovation-oriented learning behaviors, while the remaining 72% was influenced by other factors not included in the model.

Table 9. Regression Coefficients for Time Management Predicting Innovative Behavior

Predictor	B	SE B	β	t	p	95% CI
Constant	1.12	0.21		5.33	< 0.001	[0.71, 1.53]
Self-regulation based time management	0.68	0.07	0.53	9.86	< 0.001	[0.54, 0.82]

These findings indicate that self-regulation based time management was a positive and significant predictor of innovative behavior ($\beta = 0.53$, $p < 0.001$). This suggests that higher self-regulatory time management was associated with higher levels of innovative behavior among students.

Table 10. Overall Model Significance

Model	F	df	p
1	97.20	(1, 248)	< 0.001

The significant F value indicates that the regression model was statistically meaningful and capable of explaining innovative behavior among students.

Additional Analysis: Gender Differences

To provide further insight into the findings, independent samples t-tests were conducted to examine potential gender differences in both variables.

Table 11. Gender Differences in Study Variables

Variable	Male (n = 112) Mean \pm SD	Female (n = 138) Mean \pm SD	t	p
Self-regulation based time management	3.57 \pm 0.55	3.66 \pm 0.53	1.45	0.15
Innovative behavior	3.52 \pm 0.58	3.62 \pm 0.56	1.36	0.17

The results showed no statistically significant gender differences in either self-regulation based time management or innovative behavior ($p > 0.05$). Therefore, the association between self-regulation based time management and innovative behavior appears to be relatively consistent across male and female students.

Summary of Key Findings

Overall, the results can be summarized as follows:

1. Senior high school students in Medan City demonstrated moderate-to-high levels of self-regulation based time management and innovative behavior.
2. The instruments showed good reliability (Cronbach's $\alpha > 0.80$).
3. Self-regulation based time management was positively and significantly associated with innovative behavior ($r = 0.53$, $p < 0.01$) (95% CI [0.43, 0.61]).
4. Self-regulation based time management explained 28% of the variance in innovative behavior ($R^2 = 0.28$) ($F(1, 248) = 97.20$, $p < 0.001$).
5. No significant gender differences were observed, indicating stable findings across male and female students.

Discussion

This study aimed to examine the relationship between self-regulation based time management and innovative behavior among senior high school students in Medan City. The findings revealed that self-regulation based time management was positively and significantly associated with innovative behavior ($r = 0.53$, $p < 0.01$). This result indicates that students who manage their learning time in a goal-directed manner through planning, self-monitoring, and adaptive strategy adjustment tend to report higher innovative behavior in academic activities, such as experimenting with new learning approaches, expressing ideas during discussions, and developing creative solutions for school assignments (Zacks & Hasher, 1994).

Theoretically, these findings are consistent with the self-regulation framework, which suggests that effective learning behavior develops through a cyclical process of goal setting, strategic planning, performance monitoring, and reflection (Zimmerman, 2000) (Zimmerman & Schunk, 2011). Within this cycle, students with strong self-regulatory skills are better able to prioritize tasks, manage distractions, and maintain focus on academic targets. When time management is enacted as a self-regulatory process, students not only complete routine tasks but also build psychological control over how they learn. Such control is essential for innovative behavior, which requires the capacity to explore alternatives, experiment with strategies, and make learning decisions that diverge from habitual routines.

The relationship observed in this study can also be explained by the notion that innovative behavior requires sufficient cognitive and motivational resources. In learning contexts, innovative behavior is not solely about creativity but also involves initiative and willingness to try new strategies. Students with poor time management are more likely to experience time pressure, accumulated tasks, and academic anxiety, which may deplete their cognitive resources and force them to focus primarily on meeting deadlines rather than exploring new ideas. In contrast, students who regulate their time effectively are more likely to have adequate time for reflection, experimentation, and the maintenance of intrinsic motivation to complete tasks using more effective and creative approaches. This

interpretation aligns with the view that individual innovation emerges when individuals have opportunities, readiness, and strategies to actively enact behavioral change (De Jong & Den Hartog, 2010).

Amabile, (1996) componential theory of creativity emphasizes that innovative behavior is not solely determined by individual abilities, but is strongly shaped by contextual conditions that either support or constrain creative engagement. In educational settings, students' innovative behavior emerges when cognitive skills, intrinsic motivation, and a supportive learning environment interact. The present findings align with this perspective, suggesting that self-regulation based time management functions as an internal enabling condition that allows students to respond adaptively to contextual demands, thereby facilitating innovation-oriented learning behaviors.

From a motivational standpoint, self-determination theory posits that behaviors characterized by autonomy and self-initiative are more likely to foster intrinsic motivation, which is a critical driver of creativity and innovation (Ryan & Deci, 2020). Students who regulate their learning time autonomously tend to experience greater feelings of competence and control over their academic activities. This motivational state increases their willingness to experiment with new learning strategies and to engage in innovative behavior beyond routine task completion.

Importantly, the predictive contribution of self-regulation based time management to innovative behavior in this study was meaningful, as indicated by $R^2 = 0.28$. This suggests that approximately 28% of the variance in students' innovative behavior can be explained by their self-regulation based time management. The magnitude of this effect can be considered moderate and realistic within educational psychology research, given that innovative behavior is a complex construct influenced by multiple factors such as teacher support, classroom climate, self-efficacy, achievement motivation, and school culture. Nevertheless, the explanatory power of time management in this study indicates that strengthening self-regulation based time management may represent a relevant pathway for fostering innovative behavior among adolescents (Bandura, 1991) (Mangkoesebroto, 1997).

Additional analyses further showed that there were no significant gender differences in self-regulation based time management or innovative behavior. This finding suggests that the relationship between the two variables is relatively consistent among male and female students. Therefore, interventions aimed at strengthening self-regulatory time management appear broadly applicable across student groups. However, despite non-significant statistical differences, individual variability remains possible and warrants further investigation, particularly by incorporating other psychological factors as potential moderators.

Overall, this study contributes theoretically by reinforcing the perspective that time management should not be viewed merely as a technical skill but rather as a self-regulatory mechanism that shapes learning behavior. The findings support contemporary educational psychology approaches that highlight self-regulation as a key factor in academic success

and the development of twenty-first-century competencies, including innovation. By linking self-regulation based time management with innovative behavior, this study emphasizes that student innovation can be supported through intentional and reflective self-management capacities .

(Hofmann, Schmeichel, et al., 2012) highlighted that self-regulation plays a crucial role in managing situational demands and resisting immediate pressures that may undermine goal-directed behavior. In the context of this study, effective time management may help students cope with academic pressure by regulating impulses to prioritize short-term task completion over deeper engagement. As a result, students with stronger self-regulatory capacities are better positioned to maintain cognitive flexibility and sustain innovative behavior even under demanding learning conditions.

Expectancy value theory suggests that students' engagement and effort are shaped by their expectations of success and the value they assign to learning tasks (Eccles & Wigfield, 2002). Effective self-regulation based time management may strengthen both components by enhancing students' confidence in their ability to complete tasks successfully and by increasing perceived task value. Consequently, students are more likely to invest sustained effort in innovative learning activities that require persistence and adaptive problem-solving.

From a practical standpoint, the findings offer important implications for schools and educators, particularly school counselors and guidance teachers, to develop interventions targeting students' self-regulation and time management skills. Relevant programs may include training in weekly goal setting, task prioritization, progress monitoring, and strategies to reduce academic procrastination. In addition, schools can foster an innovation-supportive learning culture by implementing project-based learning, problem-solving discussions, and psychologically safe classroom environments where students feel comfortable expressing ideas.

At the institutional level, the (OCED, 2019) emphasized that innovative learning environments are characterized by autonomy, flexibility, and opportunities for reflection. The present findings complement this perspective by demonstrating that students' internal regulation of time serves as a psychological foundation that enables them to benefit from such environments. In urban educational contexts like Medan City, where academic demands and time constraints are prominent, strengthening students' self-regulation capacities may be particularly important for sustaining innovative behavior in learning.

In the context of Medan City, which represents a heterogeneous and dynamic educational setting, strengthening self-regulation through time management may be particularly relevant for helping students cope with academic demands while sustaining innovation-oriented behaviors. When students manage their time effectively, they may have greater opportunities to engage in creative and productive learning practices without being overwhelmed by accumulated tasks and academic pressure.

Conclusion

This study demonstrates that self-regulation-based time management is positively and significantly associated with innovative behavior among senior high school students in Medan City ($r = 0.53$, $p < 0.01$), with regression analysis indicating that effective time regulation accounts for 28% of the variance in innovative behavior ($R^2 = 0.28$, $p < 0.001$). These findings suggest that students who systematically regulate their time through goal setting, task prioritization, self-monitoring, and adaptive strategy adjustment are more likely to engage in innovation-oriented learning behaviors, including generating ideas, experimenting with new approaches, and implementing creative solutions to academic demands. From a practical perspective, strengthening self-regulatory time management can be considered a key psychological resource for fostering innovation competency in educational settings. Schools are therefore encouraged to integrate self-regulation practices into classroom instruction, while school counseling services may implement structured programs focusing on planning, distraction management, and reflective monitoring to reduce procrastination and support adaptive learning. At the student level, consistent application of basic time regulation strategies, such as breaking tasks into manageable steps, setting realistic deadlines, and conducting regular self-evaluations, may not only improve task completion but also create cognitive and motivational conditions conducive to innovative behavior, particularly in urban educational contexts

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