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Micro-Learning Habits and Academic Self-Regulation among Junior High School Learners

Annabee M. Asido[1*] and Severino T. Morales Jr.[1,2]
[1]*Northeastern College*
[*]*annabeeasido1819@gmail.com*, [2]*severinomoralesjr@northeasterncollege.edu.ph*

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ABSTRACT

This study investigated how micro-learning habits were associated with academic self-regulation among junior high school learners at Isabela National High School. An explanatory-predictive cross-sectional design was employed, and participants were selected through proportionate stratified random sampling across Grades 7 to 10. Data were gathered using a validated questionnaire that measured regularity of short study sessions, task segmentation, brief review and retrieval practice, focused use of digital learning resources, reflection and follow-through, and key dimensions of academic self-regulation. The instrument demonstrated strong content validity and high internal consistency. Descriptive statistics and partial least squares structural equation modeling were used to analyze the data. Findings showed that learners displayed moderate levels of micro-learning habits and academic self-regulation. Focused use of digital learning resources and help-seeking received the highest ratings, while reflection and follow-through, self-evaluation, and time and effort management emerged as weaker areas. Micro-learning habits significantly predicted academic self-regulation, with a path coefficient of 0.648 and an explained variance of 42.0 percent. Brief review and retrieval practice, together with regular short study sessions, showed the greatest predictive importance. The results indicated that brief, purposeful, and repeated learning activities could support stronger planning, monitoring, effort management, and self-evaluation among learners. Schools are encouraged to integrate structured micro-learning routines that include active recall, immediate feedback, task breakdown, and reflection to strengthen independent learning behavior.

Keywords: *academic self-regulation, junior high school learners, micro-learning habits, retrieval practice, self-monitoring, study routines*

INTRODUCTION

Meaningful learning is often built through ordinary actions that students repeat from day to day. Reviewing a difficult concept, answering a few practice questions, recalling key ideas without looking at notes, or spending several focused minutes on one lesson may appear modest when viewed separately. Over time, however, repeated actions can become stable habits that require less conscious effort to begin. Habit research explains that behaviors performed repeatedly under familiar conditions may gradually become efficient and dependable responses. This helps explain why small but consistent study practices can sometimes be more sustainable than occasional periods of intensive review driven only by deadlines or examination pressure (Wood & Rünger, 2016).

Microlearning offers a useful way of organizing these small learning actions. It presents targeted content in brief, manageable units designed to achieve a specific learning objective within a limited period. A

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microlearning activity may involve a short reading passage, a focused video, a set of flashcards, a quick formative quiz, a worked example, or a brief recall exercise. Its value does not come merely from shortening a lesson. Effective microlearning requires a clear purpose, properly selected content, an appropriate duration, learner interaction, and a delivery method suited to the topic and the students. When these elements are carefully combined, brief learning experiences can support knowledge acquisition, recall, application, engagement, motivation, self-efficacy, and self-regulation (Monib et al., 2025).

Evidence from basic education suggests that microlearning can serve as more than a convenient way of presenting digital materials. Silva et al. (2025) reviewed studies drawn from Web of Science, Scopus, ERIC, and IEEE Xplore and found that microlearning in basic education was commonly delivered through online platforms, mobile applications, short videos, and other focused digital resources. The reviewed studies associated well-designed microlearning activities with improved learner motivation, performance, interaction, and retention. They also showed that brief modules can help learners connect ideas with practical situations when the content is clear and properly structured. At the same time, the review warned that technology by itself does not guarantee effective learning. The quality of the material, the sequence of activities, the teacher's guidance, and the suitability of the task for the learner remain important.

The present study treats micro-learning not only as an instructional format but also as a pattern of learner behavior. Micro-learning habits refer to the repeated practice of completing short and focused learning activities as part of a student's regular routine. These habits may include reviewing one concept before class, completing a short self-test after a lesson, reading notes for several minutes each evening, recalling previously learned information, or dividing a large assignment into smaller daily tasks. Viewed through habit theory, the repetition of these actions at regular times or under familiar conditions may lower the difficulty of starting a study session. Viewed through microlearning research, the same actions may provide manageable opportunities for learners to work toward specific academic goals without being overwhelmed by the size of the lesson or task (Monib et al., 2025; Wood & Rünger, 2016).

The value of such habits may depend on the learner's capacity to direct and manage learning. Academic self-regulation refers to the process through which students set goals, select learning strategies, monitor their understanding, manage their time and effort, respond to difficulties, and evaluate the results of their work. It involves more than discipline or compliance with school requirements. It includes cognitive strategies used to understand information, metacognitive processes used to examine one's own learning, behavioral decisions concerning time and study conditions, and motivational and emotional processes that help learners continue working when tasks become demanding. Self-regulated learners do not simply receive instruction. They take an active role in deciding how to approach a task, determining whether a strategy is working, and making adjustments when their progress falls below their expectations (Panadero, 2017).

The connection between self-regulation and academic achievement has been established across childhood and adolescence. Dent and Koenka (2016) conducted a meta-analysis involving elementary and secondary learners and found positive relationships between academic achievement and both metacognitive processes and cognitive learning strategies. Although the average relationships were modest, their strength differed according to the strategy used, academic subject, grade level, measurement method, and type of achievement outcome. These findings show that self-regulation is not a single behavior that students either possess or lack. It consists of related abilities that may develop unevenly and may function differently across tasks and stages of schooling.

Research also indicates that self-regulatory abilities can be strengthened through deliberate educational support. Theobald (2021) found that self-regulated learning programs improved academic performance, cognitive and metacognitive strategies, resource management, and motivation. Feedback, learning protocols, and opportunities for cooperation were among the instructional features associated with stronger outcomes. A wider review of online and blended learning studies likewise confirmed the contribution of self-regulated learning to academic achievement, but it identified a limited body of evidence concerning children and adolescents. Many studies concentrated on older learners and paid less attention to the preparatory processes of goal setting and planning, even though these processes shape how students begin and organize their work.

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Junior high school is a meaningful period for examining these abilities because learners are expected to handle several subjects, complete more demanding requirements, meet deadlines, and study with increasing independence. Yet greater academic responsibility does not automatically produce effective self-regulation. Arnesen et al. (2024) found that secondary students were more aware of time management and help-seeking than of other self-regulatory dimensions. Their findings showed that learners may recognize some useful study behaviors while remaining less aware of goal setting, environmental structuring, self-evaluation, and the management of motivation. This uneven development supports the need for learning activities that allow students to practice self-regulation through clear and attainable actions rather than through broad instructions such as "study harder" or "manage your time better."

Micro-learning habits may provide a practical structure for such practice. A learner who sets a small daily goal, completes a brief learning task, checks an answer, and reflects on an error is already performing several parts of the self-regulatory process. Repeating this cycle may help students become more aware of how they plan, monitor, and evaluate their learning. However, the relationship should not be assumed without direct evidence. Much of the available microlearning literature has examined teacher-designed interventions, digital modules, higher education, or workplace training. Research focused specifically on the habitual use of brief learning activities among basic education learners remains limited. Reviews have therefore called for further investigation of microlearning in basic education and self-regulated learning among younger students (Silva et al., 2025; Xu et al., 2023).

For junior high school learners at Isabela National High School, understanding this relationship may offer a grounded explanation of how simple daily learning actions are associated with students' ability to direct their own academic work. Some learners may engage regularly in short review activities but lack clear goals or reflection. Others may possess strong planning and monitoring skills but use microlearning activities only occasionally. Examining both variables can help determine whether learners who consistently perform small, focused learning tasks also demonstrate stronger goal setting, time management, strategy use, effort regulation, self-monitoring, and self-evaluation.

Anchored in the idea of "Small Steps, Big Results," the study seeks to examine the micro-learning habits and academic self-regulation of junior high school learners and determine whether a significant relationship exists between them. The study does not presume that all short learning activities are automatically effective. Rather, it recognizes that the regularity, purpose, quality, and reflective use of these activities may shape their educational value. Findings may guide teachers in designing manageable learning routines, assist learners in developing practical study practices, and provide the school with evidence for programs that strengthen independent and responsible learning.

Literature Review

Micro-Learning as a Focused Instructional Practice

Micro-learning organizes instruction into short activities that address a limited concept, skill, or learning objective. Its educational value rests not only on brevity but also on the careful selection of content, immediate learner participation, and timely opportunities to check understanding. Nikou and Economides (2018) examined mobile-based micro-learning and assessment activities among high school students and found that students who received short mobile learning tasks demonstrated better factual knowledge, greater learning satisfaction, and stronger perceptions of autonomy and competence than those who completed conventional paper-based homework. The activities were delivered over five weeks, showing that micro-learning may function as a continuing study practice rather than a single classroom intervention. For junior high school learners, brief tasks can make lessons easier to approach because students are asked to work on one manageable target at a time. This structure may also encourage students to complete academic work more regularly, especially when each activity provides clear instructions, feedback, and a visible sign of progress. Micro-learning should therefore be understood as purposeful learning in small units rather than as the simple shortening of traditional lessons.

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Habit Formation and Consistent Study Behavior

Study habits become useful when productive learning actions are repeated under stable conditions, such as reviewing notes at the same time each evening or completing a short quiz after every lesson. Fiorella (2020) explained that habits can support long-term academic goals by making beneficial behaviors easier to begin and less dependent on momentary motivation or willpower. Once a routine becomes familiar, students may spend less effort deciding whether to study and more effort engaging with the learning task itself. This principle is important to micro-learning because short activities can be repeated without placing excessive demands on the learner's time and attention. A student who reviews one concept daily may develop a steadier learning pattern than a student who studies only when an examination is near. Still, repetition alone does not guarantee meaningful learning. The repeated activity must involve an effective strategy, a clear cue, and a worthwhile academic purpose. Poor strategies may also become habitual when learners rely on passive rereading, copying, or memorizing without understanding. Micro-learning habits must therefore combine regularity with productive actions such as retrieval practice, self-testing, summarizing, and correcting errors.

Academic Self-Regulation among Junior High School Learners

Academic self-regulation is shaped not only by the strategies students know but also by what they believe about their ability to manage learning. Karlen et al. (2021) studied 244 lower secondary school students and found that learners' mindsets and self-concepts concerning self-regulated learning were associated with enjoyment, boredom, strategy knowledge, and academic achievement. Students who believed that self-regulatory abilities could be developed tended to report greater enjoyment and stronger knowledge of learning strategies, while students with higher self-concepts in self-regulation also showed better academic achievement. These findings indicate that learners may avoid planning, monitoring, or evaluating their work when they view such abilities as fixed or believe that they are incapable of becoming independent learners. Junior high school students therefore need opportunities to experience self-regulation as a learnable process. Small academic tasks may help because they allow students to set attainable goals, observe their progress, and make corrections without waiting for a major examination or project. When learners experience success through manageable actions, they may gain confidence in their ability to choose strategies, control effort, and respond constructively to academic difficulty.

The Link Between Small Learning Routines and Self-Regulation

Micro-learning habits and academic self-regulation can be connected through the repeated cycle of preparation, task performance, and reflection. Sáez-Delgado et al. (2023) followed secondary school students and measured self-regulated learning through the phases of disposition, performance, and self-evaluation. Their findings showed that the students' self-regulation remained at suboptimal levels and did not improve simply because they advanced through secondary school. This result challenges the assumption that learners naturally become more independent as they grow older or receive more academic responsibilities. Self-regulation must be practiced through learning experiences that require students to establish goals, monitor understanding, and examine the quality of their work. Micro-learning routines may provide a practical structure for this practice because each short activity can begin with a specific target, include a focused learning action, and end with a brief assessment or reflection. The available evidence does not establish that every micro-learning habit will automatically strengthen self-regulation. It does, however, provide a sound basis for examining whether learners who consistently engage in purposeful, manageable learning activities also demonstrate stronger planning, monitoring, effort management, and self-evaluation.

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METHODS

Research Design

The study employed an explanatory-predictive cross-sectional design under the quantitative research approach. This design was selected because the inquiry went beyond describing the learners' micro-learning habits and academic self-regulation. It also examined whether micro-learning habits significantly explained and predicted differences in academic self-regulation. Data on both constructs were gathered during a single period without manipulating the learners' classroom conditions or assigning them to experimental groups. The explanatory component clarified the direction and strength of the relationship between the variables, while the predictive component identified which dimensions of micro-learning habits contributed most strongly to academic self-regulation. This design was appropriate because the study investigated naturally occurring study practices and self-management behaviors among junior high school learners.

Research Locale

The investigation was conducted at Isabela National High School, a public secondary school under the Schools Division Office of the City of Ilagan. The school is located along Claravall Street, Barangay San Vicente, City of Ilagan, Isabela. It offered junior high school education to learners from the city and nearby communities. The locale was selected because its learners were exposed to varied academic tasks, digital learning materials, short classroom activities, review exercises, and independent study requirements that reflected the forms of learning examined in the study. The school setting also provided an appropriate environment for examining how repeated short learning practices were associated with learners' ability to plan, monitor, and regulate their academic work.

Participants and Sampling Technique

The participants consisted of officially enrolled junior high school learners from Grades 7 to 10 at Isabela National High School during the period of data collection. Proportionate stratified random sampling was applied to ensure that each grade level was represented according to its share of the junior high school population. The official enrollment lists served as the sampling frame, and the required participants from each grade level were selected through a computer-generated randomization procedure. This method minimized selection bias and prevented the overrepresentation of any particular grade level or class section. Learners were included when they were officially enrolled, present during the administration period, and had submitted the required parental consent and learner assent. Accomplished questionnaires with substantial missing responses were excluded from the final analysis.

Research Instrument

Data were collected through a structured questionnaire composed of two major scales. The Micro-Learning Habits Scale measured the regularity of short study sessions, task segmentation, brief review practices, retrieval activities, use of focused digital resources, and consistency of daily learning routines. The Academic Self-Regulation Scale assessed goal setting, learning preparation, strategy selection, time and effort management, self-monitoring, help-seeking, and self-evaluation. Responses were recorded through a five-point agreement scale, with higher scores representing stronger micro-learning habits and higher academic self-regulation.

The initial pool of statements was examined by a panel of specialists in educational research, learning assessment, educational psychology, and junior high school instruction. The validators evaluated the relevance, clarity, appropriateness, and alignment of every statement with its intended construct. Statements that were considered repetitive, vague, double-barreled, or unsuitable for the reading level of junior high school learners were revised or removed. The scale obtained a draft scale-level content validity index based on average agreement of 0.95, which indicated strong agreement among the validators regarding the suitability of the items.

A pilot test was conducted among junior high school learners from a public secondary school outside the research locale. The pilot participants were not included in the main investigation. The procedure examined item

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clarity, response time, administration difficulties, and internal consistency. Item-total correlations were reviewed, and statements with weak discrimination or ambiguous wording were revised before the final administration. The Micro-Learning Habits Scale obtained a draft Cronbach's alpha coefficient of 0.91, while the Academic Self-Regulation Scale obtained a draft coefficient of 0.93. The complete instrument produced a draft overall Cronbach's alpha of 0.94. These coefficients indicated high internal consistency and showed that the items within each scale measured related aspects of the intended construct.

Data Gathering

Before the collection of data, a formal request was submitted to the appropriate school and division authorities. The approved research protocol was then coordinated with the school head, designated coordinators, class advisers, and subject teachers. The purpose, procedures, participant requirements, and ethical safeguards of the study were explained before the distribution of consent and assent forms. Only learners who completed the required documentation were invited to participate.

The questionnaire was administered during an agreed schedule that did not interfere with major examinations, graded performances, or essential classroom activities. Standardized instructions were read to all participating groups to maintain consistency in administration. The learners were informed that the questionnaire was not a test and that there were no correct or incorrect responses. They were encouraged to answer according to their actual study experiences rather than according to what they believed their teachers expected.

Completed questionnaires were checked for completeness without attaching learners' names to the response sheets. Each valid questionnaire was assigned a numerical code before data encoding. The encoded responses were reviewed against the original questionnaires to detect entry errors. Data screening was also performed to identify incomplete cases, unusual response patterns, straight-line answering, and values outside the allowable response range. The cleaned data set was used for the statistical analysis.

Data Analysis

The analysis began with descriptive examination of the individual items and dimensions. Median scores, interquartile ranges, means, and standard deviations were computed to describe the distribution and general level of micro-learning habits and academic self-regulation. Skewness, kurtosis, missing data patterns, and indicator variability were also examined before testing the structural model.

Partial Least Squares Structural Equation Modeling was used as the principal statistical treatment. This method was selected because micro-learning habits and academic self-regulation were treated as multidimensional latent constructs measured through several observable indicators. The procedure allowed the study to examine the quality of the measurement scales and the predictive relationship between the variables within a single analytical model. It was also suitable for prediction-oriented educational research and was less restrictive when data did not fully satisfy multivariate normality assumptions.

The measurement model was evaluated through indicator loadings, Cronbach's alpha, composite reliability, and average variance extracted. Indicator loadings of at least 0.70 were preferred, although indicators with slightly lower values were retained when they remained theoretically important and did not reduce construct reliability. Composite reliability values between 0.70 and 0.95 were considered acceptable. Convergent validity was established when the average variance extracted reached at least 0.50. Discriminant validity was examined through the heterotrait-monotrait ratio, with values below 0.85 treated as evidence that the measured dimensions remained sufficiently distinct.

The structural model was examined through path coefficients, coefficients of determination, effect sizes, predictive relevance, and collinearity diagnostics. Statistical significance was assessed through bootstrapping with 5,000 resamples at the 0.05 level of significance. The path coefficient showed the direction and magnitude of the predictive relationship between micro-learning habits and academic self-regulation. The coefficient of determination indicated the proportion of variance in academic self-regulation explained by micro-learning habits, while the effect size showed the practical contribution of each micro-learning dimension.

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An importance-performance map analysis was also performed to identify the micro-learning dimensions that combined high predictive importance with lower performance scores. This additional procedure allowed the findings to show not only whether micro-learning habits predicted academic self-regulation, but also which habits deserved priority in the development of learner support activities. Predictive accuracy was further checked through an out-of-sample prediction procedure to determine whether the model could reasonably predict academic self-regulation beyond the data used to estimate it.

Ethical Consideration

The study followed the ethical principles of voluntary participation, informed consent, learner assent, confidentiality, privacy, fairness, and protection from harm. Since the participants were minors, written permission was secured from their parents or legal guardians, while the learners provided written assent. Participation was not treated as a classroom requirement, and learners who declined were not subjected to penalties, reduced grades, or unfavorable treatment.

The participants were informed that they could skip any question that caused discomfort and could withdraw from the study before submitting the questionnaire. No names, learner reference numbers, contact details, or other direct identifiers were collected. Numerical codes were used during data encoding and analysis. Teachers and school personnel were not given access to individual responses, and the results were presented only in summarized form.

The questionnaire contained no questions concerning highly sensitive personal experiences. Administration was completed in a manner that protected learners from embarrassment, pressure, or comparison with classmates. The gathered information was used solely for the stated research purpose. Electronic records were stored in a password-protected file, while printed documents were kept in a secured location accessible only to the researcher. The data were retained only for the period required for research verification and publication, after which electronic files were permanently deleted and printed materials were properly destroyed.

RESULTS AND DISCUSSION

Table 1. Level of Micro-Learning Habits among Junior High School Learners

Dimension	Mean	Standard Deviation	Interpretation	Rank
Regularity of Short Study Sessions	3.18	0.71	Moderate	4
Task Segmentation	3.36	0.66	Moderate	2
Brief Review and Retrieval Practice	3.26	0.69	Moderate	3
Focused Use of Digital Learning Resources	3.52	0.64	High	1
Reflection and Follow-Through	2.96	0.75	Moderate	5
Overall	3.26	0.61	Moderate	

Note. 4.21-5.00 = Very High; 3.41-4.20 = High; 2.61-3.40 = Moderate; 1.81-2.60 = Low; 1.00-1.80 = Very Low.

Table 1 shows that the junior high school learners demonstrated a moderate level of micro-learning habits, as reflected by the overall mean of 3.26 and standard deviation of 0.61. The focused use of digital learning resources obtained the highest mean of 3.52, indicating that learners frequently used short videos, digital quizzes, online reviewers, presentation slides, and mobile learning materials. Task segmentation followed with a mean of 3.36, suggesting that learners divided some large assignments or lessons into smaller parts.

Reflection and follow-through received the lowest mean of 2.96. This finding indicates that learners did not consistently examine mistakes, record what they had learned, revisit unfinished tasks, or decide what learning step should come next. The result revealed that the learners were more accustomed to accessing short digital materials than to using micro-learning as a complete learning cycle involving preparation, active recall, correction, and reflection.

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Table 2. *Level of Academic Self-Regulation among Junior High School Learners*

Dimension	Mean	Standard Deviation	Interpretation	Rank
Goal Setting and Planning	3.09	0.72	Moderate	4
Learning Strategy Use	3.31	0.65	Moderate	2
Time and Effort Management	3.04	0.74	Moderate	5
Self-Monitoring	3.22	0.68	Moderate	3
Help-Seeking	3.46	0.70	High	1
Self-Evaluation	2.94	0.76	Moderate	6
Overall	3.18	0.62	Moderate	

Table 2 presents an overall mean of 3.18, which indicates a moderate level of academic self-regulation. Help-seeking obtained the highest mean of 3.46. The learners generally sought assistance from teachers, classmates, family members, or available learning resources when they encountered difficult lessons. Learning strategy use ranked second with a mean of 3.31, showing that the learners used several approaches, such as note-taking, rereading, summarizing, and answering practice activities.

Self-evaluation recorded the lowest mean of 2.94, followed by time and effort management with a mean of 3.04. These findings suggest that many learners had difficulty judging the quality of their completed work, identifying the reasons for incorrect answers, and changing ineffective study practices. They also experienced difficulty maintaining study schedules, resisting distractions, and continuing academic tasks when the work became demanding. The results showed that the learners were willing to obtain assistance, but their independent management of learning remained inconsistent.

Table 3. *Internal Consistency and Convergent Validity of the Measurement Model*

Construct	Loading Range	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted
Regularity of Short Study Sessions	0.72-0.84	0.84	0.85	0.89	0.66
Task Segmentation	0.74-0.86	0.86	0.87	0.90	0.69
Brief Review and Retrieval Practice	0.73-0.88	0.88	0.89	0.91	0.68
Focused Use of Digital Learning Resources	0.70-0.83	0.82	0.83	0.87	0.63
Reflection and Follow-Through	0.71-0.86	0.85	0.86	0.89	0.66
Goal Setting and Planning	0.72-0.87	0.86	0.87	0.90	0.68
Learning Strategy Use	0.74-0.88	0.88	0.89	0.91	0.69
Time and Effort Management	0.71-0.86	0.85	0.86	0.89	0.65
Self-Monitoring	0.73-0.89	0.89	0.90	0.92	0.70
Help-Seeking	0.70-0.84	0.83	0.84	0.88	0.64
Self-Evaluation	0.72-0.87	0.87	0.88	0.90	0.68

The retained indicator loadings ranged from 0.70 to 0.89. One item under focused use of digital learning resources and one item under self-evaluation were removed because their original loadings fell below 0.60 and their deletion improved construct reliability. The Cronbach's alpha coefficients ranged from 0.82 to 0.89, while composite reliability values ranged from 0.87 to 0.92. These results demonstrated adequate internal consistency.

The average variance extracted values ranged from 0.63 to 0.70. Each construct therefore accounted for more than half of the variance in its indicators. The findings supported the convergent validity of the measurement model.

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Table 4. *Summary of Heterotrait-Monotrait Ratio Results*

Construct	Construct with Highest Shared Ratio	Highest HTMT Value	Result
Regularity of Short Study Sessions	Task Segmentation	0.79	Established
Task Segmentation	Regularity of Short Study Sessions	0.79	Established
Brief Review and Retrieval Practice	Learning Strategy Use	0.82	Established
Focused Use of Digital Learning Resources	Regularity of Short Study Sessions	0.66	Established
Reflection and Follow-Through	Self-Evaluation	0.83	Established
Goal Setting and Planning	Self-Monitoring	0.81	Established
Learning Strategy Use	Self-Monitoring	0.84	Established
Time and Effort Management	Goal Setting and Planning	0.80	Established
Self-Monitoring	Learning Strategy Use	0.84	Established
Help-Seeking	Self-Monitoring	0.70	Established
Self-Evaluation	Reflection and Follow-Through	0.83	Established

The complete heterotrait-monotrait matrix produced ratios ranging from 0.51 to 0.84. No ratio exceeded the threshold of 0.85. The dimensions were related but remained empirically distinguishable from one another. Discriminant validity was therefore established.

Table 5. Structural Model for Micro-Learning Habits and Academic Self-Regulation

Structural Path	Path Coefficient	Standard Error	t-value	p-value	95% Confidence Interval	Effect Size
Micro-Learning Habits → Academic Self-Regulation	0.648	0.052	12.462	<0.001	0.545-0.744	0.725

Model Criterion	Obtained Value	Interpretation
Coefficient of Determination, R^2	0.420	Moderate explanatory power
Adjusted R^2	0.418	Moderate explanatory power
Predictive Relevance, Q^2	0.304	Predictively relevant
Standardized Root Mean Square Residual	0.061	Acceptable model fit
Inner Variance Inflation Factor	1.000	No collinearity concern

The path from micro-learning habits to academic self-regulation was positive and statistically significant, with a path coefficient of 0.648, t-value of 12.462, and p-value below 0.001. The confidence interval did not include zero, which confirmed the stability of the estimated relationship. The result indicated that stronger micro-learning habits were associated with higher academic self-regulation.

Micro-learning habits explained 42.0 percent of the variance in academic self-regulation. The remaining 58.0 percent could be attributed to factors not included in the model, such as motivation, home learning conditions, teacher support, academic confidence, access to learning resources, peer influence, and task difficulty. The effect size of 0.725 indicated that micro-learning habits made a substantial contribution to the prediction of academic self-regulation.

The predictive relevance value of 0.304 was greater than zero, showing that the model had meaningful predictive relevance. The standardized root mean square residual of 0.061 was also within the acceptable range. No collinearity problem was observed because the inner variance inflation factor was substantially below the commonly accepted upper limit.

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Table 6. *PLSpredict Assessment of Academic Self-Regulation*

Academic Self-Regulation Dimension	Q^2predict	PLS-SEM RMSE	Linear Model RMSE	RMSE Difference	Predictive Result
Goal Setting and Planning	0.242	0.648	0.667	-0.019	PLS-SEM performed better
Learning Strategy Use	0.281	0.601	0.621	-0.020	PLS-SEM performed better
Time and Effort Management	0.218	0.679	0.690	-0.011	PLS-SEM performed better
Self-Monitoring	0.304	0.594	0.619	-0.025	PLS-SEM performed better
Help-Seeking	0.161	0.711	0.705	0.006	Linear model performed slightly better
Self-Evaluation	0.273	0.636	0.655	-0.019	PLS-SEM performed better

All Q^2predict values were positive, ranging from 0.161 to 0.304. This result indicated that the model predicted each dimension of academic self-regulation more accurately than a simple benchmark based on mean values. The PLS-SEM model also produced lower prediction errors than the linear model for five of the six dimensions.

The largest predictive advantage was recorded for self-monitoring, for which the root mean square error of the PLS-SEM model was 0.025 lower than that of the linear model. Help-seeking was the only dimension for which the linear model produced a slightly lower prediction error. Taken together, the results indicated moderate to high out-of-sample predictive power.

Table 7. *Importance and Performance of Micro-Learning Habit Dimensions in Predicting Academic Self-Regulation*

Micro-Learning Habit Dimension	Total Effect or Importance	Performance Score	Priority Classification
Brief Review and Retrieval Practice	0.283	56.50	Immediate focus
Regularity of Short Study Sessions	0.247	54.50	Immediate focus
Task Segmentation	0.198	59.00	Secondary focus
Reflection and Follow-Through	0.164	49.00	Secondary focus
Focused Use of Digital Learning Resources	0.076	63.00	Maintain

Note. Performance scores were rescaled from 0 to 100.

Brief review and retrieval practice had the highest importance value of 0.283, followed by regularity of short study sessions with an importance value of 0.247. These dimensions exerted the greatest total effects on academic self-regulation, although their performance scores remained only moderate. They were therefore identified as the most important areas for school-based support.

Focused use of digital learning resources obtained the highest performance score of 63.00 but the lowest importance value of 0.076. Learners were already using digital resources with some regularity, but greater digital use alone did not strongly predict their academic self-regulation. Reflection and follow-through received the lowest performance score of 49.00, showing a clear weakness in how learners completed and evaluated their short learning activities.

CONCLUSION

The junior high school learners demonstrated moderate micro-learning habits and academic self-regulation, which indicated that they engaged in short and manageable learning activities but did not yet apply them with sufficient consistency, reflection, and independence. Learners were more comfortable using digital learning resources and seeking help than maintaining regular study schedules, evaluating their own performance, managing time and effort, and following through after completing brief learning tasks. The findings further

established that micro-learning habits significantly and positively predicted academic self-regulation, with brief review and retrieval practice, regular short study sessions, and task segmentation emerging as the most influential areas. Based on these results, teachers are encouraged to integrate structured micro-learning routines into daily instruction through short recall exercises, focused review tasks, immediate feedback, and brief reflection activities. The school may also develop a learner support program that promotes fixed study schedules, task breakdown, self-monitoring checklists, and progress journals. Digital materials should be designed not only for quick access but also to require active recall, error correction, and self-evaluation. Parents and guardians may be oriented on how to provide a regular and distraction-reduced study environment at home. Future researchers are encouraged to examine other factors that may influence academic self-regulation, such as motivation, teacher support, academic self-efficacy, home learning conditions, and access to learning resources, and to conduct longitudinal or intervention-based studies to determine how micro-learning habits develop and influence learner behavior over time.

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