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The Effects of Extended Review Sessions Interspersed with Short Rest Intervals on Knowledge Retention Among First-Year Nursing Students

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Abstract

Knowledge retention is essential in nursing education, particularly in foundational courses that require students to understand and apply complex theoretical concepts. This study examined the effects of extended review sessions interspersed with short rest intervals on knowledge retention among first-year nursing students at a private higher education institution in Bulacan, Philippines. A quantitative, two-group pretest–posttest design was employed involving 60 nursing students, with 30 participants in the experimental group and 30 in the control group. Over a two-week period, the experimental group was instructed to follow structured review sessions consisting of 25 minutes of focused study followed by five-minute rest intervals, while the control group continued their usual review practices without prescribed study-and-rest intervals. Knowledge outcomes were assessed using a researcher-developed 30-item examination administered before and after the intervention period. Descriptive findings showed improvements in both groups. The experimental group's mean score increased from 14.7 to 21.9, representing a 7.2-point improvement, while the control group's mean increased from 13.9 to 19.9, representing a 6.0-point improvement. Although the experimental group demonstrated a larger descriptive gain, reconstructed between-group analyses did not establish a statistically significant difference; the underlying statistical output remains to be verified. The findings suggest that structured review sessions incorporating short rest intervals warrant further investigation as a feasible learning strategy in nursing education.

Keywords: *knowledge retention; structured review sessions; rest intervals; nursing education; experimental psychology; study strategies*

1. Introduction

Knowledge retention constitutes a fundamental component of effective learning, particularly in academic disciplines that require students to acquire, integrate, and apply complex theoretical information. In nursing education, the retention of foundational knowledge is essential for developing clinical reasoning, professional judgment, and evidence-informed practice. Theoretical Foundations of Nursing introduces students to nursing metaparadigms, conceptual models, and theoretical frameworks that provide the intellectual basis for professional practice. Mastery requires more than immediate memorization: students must retrieve and apply relevant information as they advance through academic and clinical training (Alligood, 2021; Quiambao-Udan, 2020).

The demands of nursing education present considerable challenges, particularly for first-year students. Extensive theoretical content, unfamiliar terminology, and conceptual complexity require sustained cognitive engagement and effective study strategies. In the Philippines, health professions programs also operate amid psychosocial strain, generational shifts in learning preferences, and licensure-driven expectations that shape learner preparedness (Atento et al., 2025). Conventional practices often involve prolonged review sessions with few planned opportunities for cognitive recovery. Although this approach exposes learners to substantial material, working memory limitations and the organization of learning experiences may influence what they ultimately retain (Chen et al., 2018, 2021).

Research in cognitive and educational psychology emphasizes the temporal organization of learning. Cepeda et al. (2006) demonstrated that distributing practice across separate learning episodes improves subsequent recall

relative to massed practice. Carpenter et al. (2022) similarly identified spacing and retrieval practice as important principles for durable learning. These findings indicate that learning outcomes depend not only on total study time but also on how learning opportunities are organized. However, distributing study across different occasions is not equivalent to inserting brief rest intervals within individual review sessions.

Short rest intervals represent another potentially useful component of structured study. Chen et al. (2018) examined the relationship between cognitive resource depletion and spacing effects, suggesting that the management of cognitive demands deserves attention in learning design. In a meta-analysis, Albulescu et al. (2022) found that micro-breaks can improve well-being, although performance effects vary with task characteristics. Evidence from an experimental study by Ginns et al. (2023) also indicates that brief rests can benefit attention and learning in particular instructional circumstances.

This issue is salient in health professions education, where theoretical understanding must eventually inform clinical decision-making. Khalafi et al. (2024) reported favorable learning and retention outcomes associated with spaced learning among nurse anesthesia students. Nevertheless, findings from advanced learners and from distributed instruction cannot automatically be generalized to first-year nursing students using five-minute breaks during independent study. In the Philippine context, variation in nursing curricular organization further reinforces the value of examining strategies within the educational setting in which they will be used (Reblando, 2018). Broader analyses of the Philippine qualification system have likewise noted that licensure examination dynamics can favor review-oriented over competency-developmental instruction (Quinto et al., 2026).

The present study addressed this gap by comparing a recommended schedule of 25 minutes of focused review followed by five minutes of rest with students' usual study practices over two weeks. Both groups completed assessments of selected topics in Theoretical Foundations of Nursing before and after the review period. This design permits examination of changes in test performance, while its ability to establish intervention-specific effects depends on the comparability of groups and the validity of the statistical analysis.

Objectives of the Study

This study aimed to examine the effects of extended review sessions interspersed with short rest intervals on knowledge assessment performance among first-year nursing students at a private higher education institution in Bulacan, Philippines. Specifically, it sought to: (1) describe pretest and posttest scores in the experimental and control groups; (2) examine changes in scores within each group; (3) compare posttest performance and pretest–posttest gains between groups; and (4) assess whether the available evidence supports the proposed review-and-rest arrangement as an effective learning strategy.

2. Review of Related Literature

2.1 Structured Review Sessions and Distributed Learning

The timing and organization of study opportunities influence subsequent knowledge retention. In a quantitative synthesis of distributed practice research, Cepeda et al. (2006) demonstrated that learning distributed across separate episodes generally supports better retention than concentrated practice. Carpenter et al. (2022) further emphasized the complementary roles of spacing and retrieval practice in promoting durable learning. Rather than relying exclusively on extended exposure, learners may benefit from revisiting information and attempting to retrieve previously encountered concepts.

Sewang (2021) compared spacing and massed instruction in educational contexts, providing additional evidence that instructional arrangement can influence learning outcomes. Kornmeier et al. (2022) investigated the effects of spacing learning units on both learning and forgetting, reinforcing the relevance of temporal distribution. Chen et al. (2021) clarified that spacing and interleaving have distinct theoretical explanations, with working memory considerations central to the former and discriminative contrasts important to the latter. Such distinctions matter when students must differentiate related nursing theories and conceptual models.

These studies establish a rationale for structured study practices, but their findings should not be treated as direct evidence for a 25-minute study and five-minute rest schedule. Distributed practice across distinct learning episodes may involve different mechanisms from brief pauses within one session. The present intervention therefore requires evaluation on its own terms.

2.2 Short Rest Intervals, Cognitive Load, and Attentional Recovery

Brief breaks may influence the ability to sustain cognitively demanding work. Cognitive load theory provides a framework for understanding how processing demands interact with limited working memory resources (Chen et al., 2018, 2021). Planned interruptions may offer opportunities to manage fatigue, but the consequences of such pauses depend on the activity, the learner, and the nature of the task. A thematic review of cognitive load and learning in extended reality similarly concluded that learning effects are contingent on task, learner, and instructional design characteristics, and that poorly aligned learning conditions may increase cognitive burden (Atento et al., 2026).

Albulescu et al. (2022) reviewed and meta-analyzed studies of micro-breaks, reporting benefits for well-being alongside more variable findings for performance. Ginns et al. (2023) experimentally examined rest breaks, directed attention, and learning, providing more direct evidence that brief pauses can benefit certain educational tasks. Hamilton and Stachowski (2025) studied undergraduates' break-taking behavior and perceptions, showing that students vary in how they use breaks and in the benefits they perceive. Nastasi et al. (2023), in a study of rest breaks and productivity, contributed further evidence that programmed pauses can alter task performance in particular settings.

These findings support an investigation of short rests within study routines, but they do not determine a universally optimal interval. Learning materials, break activities, the number of repeated cycles, and adherence to instructions could all moderate outcomes. Accordingly, the effectiveness of the particular review-and-rest arrangement investigated here must be established empirically rather than inferred from the broader micro-break literature.

2.3 Knowledge Retention and Effective Study Strategies

Knowledge retention concerns the continued availability of learned information for later recognition, recall, or application. The interval between learning and assessment is central to interpreting retention claims. Carpenter et al. (2022) identified spacing and retrieval practice as ways of supporting later recall, while Voice and Stirton (2020) described spaced repetition as a potentially useful approach in science, technology, engineering, and mathematics education. These findings emphasize the importance of study organization when learners must preserve access to complex concepts.

Students may nevertheless prefer familiar study routines even when alternative arrangements have empirical support. Yuan (2022) examined the spacing effect in relation to learners' perceptions of learning, illustrating why subjective impressions of study effectiveness need not align with objective performance. Strategies should therefore be evaluated using appropriate measures rather than assumptions about what learners find comfortable or familiar.

In the present study, the same 30-item assessment was administered before and after a two-week review period. This permits the examination of score changes following review activities but does not establish how much information would remain accessible after an extended follow-up interval. The distinction between post-intervention performance and delayed retention is essential for a cautious interpretation of the results.

2.4 Structured Learning Strategies in Nursing and Health Professions Education

Foundational nursing education requires students to organize and apply theoretical models that later inform professional practice. Alligood (2021) described the significance of nursing theories in professional knowledge, while Quiambao-Udan (2020) presented relevant conceptual frameworks for nursing coursework. Among Philippine nursing students, simulation-based strategies have been used to provide structured opportunities to apply theoretical knowledge, with instructional quality emerging as more important than exposure frequency alone

(Cabanban et al., 2026). These learning demands provide a rationale for examining study practices that help beginning students manage and retrieve theoretical material.

Health professions research offers evidence concerning the effects of organizing learning over time. Khalafi et al. (2024) investigated spaced learning among nurse anesthesia students and reported favorable learning and retention outcomes. Kamali and Mousavi (2024) examined spaced learning in nursing education, focusing on evaluation scores and educational quality. Timmer et al. (2020) studied spaced instruction and knowledge retention in medical education. In Philippine health professions education, students evaluating a structured licensure enhancement program rated lecture content and perceived knowledge improvement favorably, while time allotment received the lowest rating (Liwanag et al., 2026). Although relevant, these investigations employed instructional arrangements and student populations that are not identical to the independent review-and-rest protocol examined here.

Reblando (2018) compared the Philippine nursing curriculum with curricula elsewhere, underscoring the importance of interpreting educational strategies in their curricular context. The reviewed evidence thus supports further investigation among first-year nursing students, while leaving unresolved whether five-minute breaks during scheduled independent review produce an advantage over usual study behavior.

2.5 Synthesis and Literature Gaps

The available literature indicates that the temporal organization of learning and the management of cognitive demands may affect performance. Distributed practice and retrieval are supported by a substantial evidence base (Cepeda et al., 2006; Carpenter et al., 2022), whereas the influence of micro-breaks varies with task characteristics (Albulescu et al., 2022; Ginns et al., 2023). Studies in nursing and medical education provide encouraging evidence concerning spaced learning (Khalafi et al., 2024; Kamali & Mousavi, 2024; Timmer et al., 2020).

Three gaps are especially relevant. First, benefits associated with distributing study across separate occasions do not necessarily extend to brief rest periods within a session. Second, evidence from advanced health professions learners may not represent the demands faced by first-year nursing students. Third, the cited studies provide limited direct evidence about a prescribed 25-minute review/five-minute rest schedule applied to foundational nursing theory content. The present study responds by comparing this approach with usual review practices using pretest and posttest knowledge assessments, while acknowledging the limitations of its implementation and assessment schedule.

3. Methodology

3.1 Research Design

A quantitative, two-group pretest–posttest intervention design was used to examine knowledge assessment performance following structured review sessions incorporating short rest intervals. One group received instructions to follow the review-and-rest schedule, while the comparison group continued its usual review practices. Both groups completed the same assessment before and after the two-week period. The design allowed within-group and between-group comparisons, although the source documentation does not conclusively establish individual-level random assignment.

3.2 Participants

The participants were 60 first-year Bachelor of Science in Nursing students enrolled in Theoretical Foundations of Nursing at a private higher education institution in Bulacan, Philippines. The study identified approximately 300 students in the relevant first-year nursing population. Thirty participants were included in the experimental group and 30 in the control group. Overall, 48 participants (80.0%) were female and 12 (20.0%) were male. The experimental group included 23 female and seven male students; the control group included 25 female and five male students.

3.3 Sampling Technique

The reported selection procedure was based on class sections. Available first-year nursing sections were listed, and two sections were selected using an online random-selection tool. Thirty students from each section were invited to participate. Although the paper refers elsewhere to random assignment, the procedural description documents section selection rather than verified individual random allocation. Consequently, the exact assignment mechanism and potential section-level effects require confirmation.

3.4 Research Instrument

Knowledge performance was measured using a researcher-developed, 30-item multiple-choice assessment aligned with Course Learning Outcome 3 of Theoretical Foundations of Nursing. The same instrument was administered at pretest and posttest; scores therefore ranged from 0 to 30. The course instructor and academic adviser reviewed the test for content relevance and curricular alignment. The source paper did not provide a numerical reliability coefficient or item-analysis findings.

3.5 Data Gathering Procedure

Permission was secured from the relevant nursing course coordinator. Eligible students were invited to participate, informed of the procedures and their right to withdraw, and asked to provide written informed consent. The pretest was administered in a controlled classroom setting.

The intervention was conducted over two weeks. Participants in the experimental group were instructed to organize independent review into 25-minute focused study periods followed by five-minute rest intervals. Two review sessions per week, or approximately four sessions in total, were recommended; continuation of additional study was left to participants' discretion. The control group was advised to continue usual review practices without a prescribed review-and-rest structure. Both groups reviewed content aligned with the same course learning outcome.

Students completed review activities independently at times and locations of their choosing. Timestamped photographs of study materials at the beginning and end of sessions were requested as documentation of participation, but these photographs could not independently verify adherence to every prescribed interval. After the two-week period, the posttest was administered in a controlled classroom setting over approximately 45 minutes. Records were coded and entered into a secured spreadsheet.

3.6 Data Analysis

Frequencies and percentages summarized the gender distribution; group means and standard deviations described pretest and posttest scores. A Pearson chi-square test was reported for gender by group. The original analysis also specified an independent-samples t-test for posttest scores, with Levene's test to assess variance homogeneity, and separate paired-samples t-tests for within-group changes. Statistical significance was assessed at $\alpha = .05$. Because several inferential statistics in the original manuscript were inconsistent with its descriptive values, conventional tests were independently reconstructed from the published rounded summary statistics for reporting in Section 4. These reconstructions are provisional and do not replace reanalysis of the original dataset. An additional comparison of gain scores was reconstructed to address differential improvement between groups.

3.7 Ethical Considerations

The study reported voluntary participation, prior written consent, permission from the nursing course coordinator, and the right to withdraw without academic penalty. Participant records were coded, electronic information was stored in a password-protected spreadsheet, and printed records were secured. Data handling was described as consistent with the principles of Republic Act No. 10173, the Philippine Data Privacy Act of 2012. Nonfinancial tokens of appreciation were provided, and the researcher declared no conflict of interest. The source material did not report a formal institutional ethics committee approval number.

4. Results and Discussion

4.1 Demographic Characteristics of Participants

Sixty first-year nursing students participated, evenly distributed between the experimental and control conditions. Females constituted 80.0% (n = 48) of the sample and males 20.0% (n = 12). The experimental group had 23 females (76.7%) and seven males (23.3%), compared with 25 females (83.3%) and five males (16.7%) in the control group. The source reported $\chi^2(1, N = 60) = 0.45$, $p = .50$. Recalculation from the frequency counts yields Pearson $\chi^2(1) \approx 0.42$, $p \approx .519$, also indicating a nonsignificant association. This result does not prove that the groups were otherwise equivalent or eliminate possible confounding.

4.2 Pretest and Posttest Knowledge Assessment Scores

Table 1 presents the descriptive scores. Both groups improved over the two-week period. The experimental group had a slightly higher baseline mean (14.7 versus 13.9) and a higher posttest mean (21.9 versus 19.9). The corresponding mean gains were 7.2 and 6.0 points, respectively. The 1.2-point difference in average gains favored the experimental group descriptively, but a between-group inferential comparison is required before concluding that the structured schedule was superior.

Table 1. *Pretest and Posttest Knowledge Assessment Scores by Group*

Group	n	Pretest M (SD)	Posttest M (SD)	Mean gain
Experimental	30	14.7 (3.7)	21.9 (5.5)	7.2
Control	30	13.9 (3.8)	19.9 (5.8)	6.0

Note. Scores are out of 30. Mean gain is the difference between the group posttest and pretest means.

4.3 Changes in Knowledge Assessment Scores Within Groups

Paired-samples t-tests were reported for within-group changes. The original manuscript supplied the mean and standard deviation of each group's paired differences, but the published t statistics were not fully consistent with those summaries. Table 2 therefore presents independent reconstructions from the reported rounded difference statistics. Both groups demonstrated statistically significant within-group improvement ($p < .001$). Importantly, significant improvement within each condition does not by itself demonstrate that the improvements differed significantly between conditions.

Table 2. *Within-Group Changes in Knowledge Assessment Scores*

Group	Mean gain	SD of differences	Approx. t(29)	p	95% CI
Experimental	7.2	4.6	8.57	< .001	[5.48, 8.92]
Control	6.0	4.9	6.71	< .001	[4.17, 7.83]

Note. The test statistics and confidence intervals were reconstructed using the rounded group difference means and difference standard deviations reported in the original paper. They require confirmation against original individual-level observations.

4.4 Between-Group Differences in Knowledge Assessment Performance

The central question was whether the structured review-and-rest schedule produced an advantage over usual study practices. The source reported a significant posttest difference, $t(58) = 2.03$, $p = .047$. However, that t statistic is not compatible with its reported group means, standard deviations, and sample sizes. Using those summary values, the independent-samples comparison yields approximately $t(58) = 1.37$, $p = .176$. A separate comparison of mean gains yields approximately $t(58) = 0.98$, $p = .332$ (Table 3). Neither reconstructed confidence interval excludes zero.

Table 3. *Reconstructed Between-Group Comparisons of Knowledge Assessment Outcomes*

Comparison	Mean difference	Approx. t(58)	p	95% CI	Cohen's d

Comparison	Mean difference	Approx. t(58)	p	95% CI	Cohen's d
Posttest scores	2.0	1.37	.176	[−0.92, 4.92]	0.35
Pre–post gains	1.2	0.98	.332	[−1.26, 3.66]	0.25

Note. Positive values favor the experimental group. Inferential values were reconstructed from rounded descriptive statistics under conventional independent-samples assumptions. They have not been checked against the original participant-level data or adjusted for possible class-section clustering.

Accordingly, the experimental group exhibited a numerically higher mean posttest score and gain, but the available reconstructed tests do not establish a statistically significant between-group advantage at $\alpha = .05$. This interpretation is provisional. Reanalysis using the original statistical output and participant-level data is necessary, particularly because the reported section-based sampling may violate assumptions of independence if the conditions were assigned at the section level.

4.5 Discussion

Both groups demonstrated improved performance following the review period, and the experimental group showed a larger descriptive gain. However, conventional comparisons reconstructed from the available summary statistics did not establish a significant advantage of structured review with short rests over usual study practices. This distinction is important: within-group improvements may reflect additional course exposure, practice with the same test, maturation, or other concurrent learning activities rather than an intervention-specific effect.

The observed improvements are broadly compatible with research showing that the organization and repetition of study activities matter for learning. Cepeda et al. (2006) and Carpenter et al. (2022) provide evidence that distributed practice and retrieval can support later recall. These studies, however, do not establish that the insertion of five-minute rests within a review session is responsible for improved outcomes in the present sample.

The descriptive advantage of the experimental group is also consistent with the possibility that planned rests help manage cognitive demands. Albulescu et al. (2022) reported well-being benefits of micro-breaks with variable performance effects, while Ginns et al. (2023) found benefits for attention and learning under particular experimental conditions. These studies provide plausible theoretical context but not direct evidence for the mechanism operating in the present study.

Research in nursing and medical education offers further context. Khalafi et al. (2024), Kamali and Mousavi (2024), and Timmer et al. (2020) examined spaced learning and knowledge outcomes among health professions learners. Their interventions differed from the independently completed 25/5 review arrangement, so equivalence between the approaches should not be presumed.

Interpretation is constrained by several methodological features. Review activities were completed independently, and adherence to the recommended schedule was not directly verified. Engagement in independent study may also vary with students' motivational orientation; among college students in a Philippine higher education institution, controlled motivation was moderately associated with academic engagement (Borinaga et al., 2026). The usual-practice control condition was not a standardized uninterrupted study protocol. The source documentation does not conclusively establish individual randomization, and the use of two selected class sections introduces possible section-level differences. The identical pretest and posttest may have produced practice effects; the absence of a delayed follow-up limits claims about long-term retention. Reliability evidence for the researcher-developed instrument was not reported. Finally, the inferential comparisons require confirmation against the original dataset.

Taken together, the study provides preliminary evidence that a structured review-and-rest schedule is feasible and was associated with a larger descriptive gain, but it does not establish a statistically reliable advantage over usual study behavior. More controlled research with documented allocation, comparable study exposure, reliable assessments, adherence checks, and delayed follow-up is necessary.

5. Conclusions, Recommendations, and Implications

5.1 Conclusions

The study examined knowledge assessment performance among 60 first-year nursing students who followed either a prescribed 25-minute review and five-minute rest arrangement or their usual review practices over two weeks. Both groups improved: the experimental mean rose from 14.7 to 21.9 (gain = 7.2 points), and the control mean rose from 13.9 to 19.9 (gain = 6.0 points).

Although the experimental group recorded a larger numerical improvement, reconstructed posttest and gain-score comparisons did not establish a statistically significant between-group advantage. These comparisons are provisional until verified against the original statistical output. The evidence therefore does not support a definitive causal conclusion that scheduled short rest intervals are more effective than usual review practices.

Uncertain individual-level allocation, variable independent study behavior, limited adherence verification, repeated administration of the same assessment, and the absence of delayed follow-up also constrain interpretation. The findings concern performance following the study period more directly than long-term retention. The intervention remains a feasible learning arrangement that merits further controlled investigation.

5.2 Recommendations

Nursing educators may present structured review-and-rest schedules as optional study-management approaches rather than established superior learning interventions. Students can consider brief planned pauses alongside other evidence-informed practices, while evaluating whether the schedule helps maintain consistent and focused study.

Educational institutions should avoid mandating a specific 25/5 schedule solely on the basis of the present results. Where the approach is piloted, evaluations should document implementation fidelity, study duration, and learning outcomes.

Future research should clarify the assignment mechanism and, where feasible, use individually randomized groups or designs that account for class-section clustering. Study materials and total review exposure should be standardized between conditions, and adherence should be monitored more directly. Validated instruments, documented reliability, alternative test forms where practical, and delayed retention assessments would strengthen the evidence. Larger and more diverse samples and baseline-adjusted analyses may also provide more precise estimates of any intervention effect.

5.3 Implications of the Study

Theoretically, the study reinforces the need to distinguish distributed practice across learning occasions from short rests within individual study sessions. Improvements in knowledge scores do not establish the cognitive mechanism underlying those improvements.

Practically, a prescribed study-and-rest arrangement is simple to implement and may help some students organize independent review. Its feasibility should not be equated with confirmed superiority, and educators should retain flexibility in recommending study strategies.

Methodologically, the study demonstrates the importance of distinguishing within-group change from intervention-specific between-group effects, documenting intervention adherence, confirming statistical output, and choosing outcome assessments appropriate to the claimed duration of retention. Institutionally, these considerations can guide more rigorous evaluations of learning support strategies before broader curricular adoption.

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