



Effectiveness of Structured Ice-Breaking Activities in Enhancing Learning Concentration among Nursing Undergraduates: A Quasi-Experimental Study

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Abstract: -

Background: Continuous didactic instruction in health professions curricula presents cognitive challenges that lead to attentional decay and increased cognitive load. To counteract classroom fatigue, active micro-interventions have gained attention in nursing education. This study evaluated the effectiveness of a structured, four-phase ice-breaking intervention on improving learning concentration among first-year undergraduate nursing students.

Methods: A single-arm, quasi-experimental pre-test/post-test study was conducted among 53 first-year B.Sc. Nursing students taking the Nursing Foundations course at a college of nursing in Puducherry, India. The intervention was delivered across 12 50-minute lecture sessions over four weeks. Each session incorporated two 5-minute validated ice-breaking activities embedded at the mid-session and terminal points. Student concentration was measured at baseline and after a one-week washout period using the validated Mizan-Meta Concentration Scale (score range: 4–20). Pre- and post-intervention scores were compared using a paired Student's *t*-test.

Results: At baseline, the mean concentration score was 13.40 ± 1.94 , with 73.6% ($n = 39$) of participants categorized as having adequate concentration and 26.4% ($n = 14$) as moderate. Following the four-week intervention, 100% ($n = 53$) of students achieved adequate concentration levels, with the mean score increasing to 17.94 ± 1.25 . The absolute mean improvement of 4.54 points was statistically significant ($t(52) = -16.05, p < 0.001$).

Conclusion: Embedding brief, structured ice-breaking activities within traditional lecture blocks significantly improved self-reported learning concentration among undergraduate nursing students. This low-resource pedagogical approach serves as an effective cognitive reset to mitigate attentional decay in dense healthcare curricula.

In addition, brief notes on the epistemology of medical and pharmacological science.

Keywords: Ice-breaking activities, Learning concentration, Nursing education, Active learning, Cognitive load, Undergraduate nursing, Quasi-experimental study.

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Introduction

Sustained attention and cognitive focus are fundamental prerequisites for information processing, clinical reasoning, and long-term knowledge retention within accelerated health professions curricula. Worldwide, there are approximately 1.3 billion adolescents (aged 10–19 years), accounting for nearly 16% of the global population, with almost 90% residing in low- and middle-income countries (1, 2). South Asia harbors the largest regional concentration of youth globally, with India alone home to approximately 253 million adolescents—representing 20.9% of the nation's total population (1, 3). Adolescence marks a critical developmental transition characterized by dynamic neurobiological maturation and psychosocial growth, during which individuals acquire physical, emotional, cognitive, and social resources that lay the groundwork for lifelong health and capability (2, 3).

In undergraduate nursing education, late adolescents and young adults frequently encounter rigid, high-pressure environments requiring them to master dense anatomical, pharmacological, and physiological concepts through continuous didactic instruction (4, 5). However, human cognitive architecture imposes natural constraints on continuous information processing. Psychological and pedagogical research demonstrates that adult attention during passive lectures peaks within the first 10 to 15 minutes before experiencing a sharp decline, with cognitive fatigue and mind-wandering increasing exponentially after 20 minutes of instruction (6). This intrinsic attentional decay is significantly exacerbated by contemporary digital lifestyle factors and rapidly changing social environments, leaving incoming undergraduate cohorts with heightened baseline cognitive distraction and reduced sustained focus spans (3, 4).

According to Sweller's Cognitive Load Theory, prolonged passive listening overloads working memory capacity, leading to an accumulation of extraneous cognitive load and subsequent attentional drift (7). Furthermore, Krashen's Affective Filter Hypothesis posits that the stress, vocabulary overload, and intimidation associated with transitioning into professional clinical training act as emotional barriers that hinder optimal learning (8). To counteract these challenges, structured ice-breaking techniques have emerged as a powerful pedagogical tool to overcome academic fatigue, reduce stress, and maximize focus (4, 5). When strategically integrated into lecture blocks, these micro-interventions provide immediate student refreshment across three core domains: cognitive, emotional, and physical refreshment (5).

While active learning strategies are widely recommended, empirical data quantifying the direct impact of timed ice-breaking activities on real-time student concentration profiles within regional Indian nursing colleges remains limited. Therefore, this study evaluated the pedagogical

efficacy of a structured, 50-minute four-phase ice-breaking intervention on optimizing learning concentration among first-year B.Sc. Nursing students in Puducherry, India.

Materials and Methods

Study Design, Setting, and Ethics

To evaluate the pedagogical impact of structured ice-breaking activities on student engagement within a tight academic calendar, a single-arm, quasi-experimental pre-test/post-test design was utilized. The study was conducted between July and August 2024 at the College of Nursing, East Coast Institute of Medical Sciences, Puducherry. The study cohort comprised a convenience sample of 53 first-year Bachelor of Science (B.Sc.) Nursing students enrolled in the Nursing Foundations course. First-year cohorts were specifically selected to mitigate historical confounding and contamination bias stemming from prior exposure to tertiary nursing instructional methods. Students who were absent during the initial baseline session were excluded from the final analytical sample.

Ethical clearance was obtained from the Institutional Ethics Committee (IEC) prior to study initiation. Participation was entirely voluntary, and written informed consent was secured from all participants. To protect student autonomy and preserve data integrity, complete anonymity was guaranteed, and participants were explicitly assured that their decision to participate—or their performance during the sessions—would carry no weight in their formal academic evaluations or course grading.

Intervention Protocol and Delivery

The pedagogical intervention was embedded within a standardized three-day lecture block focusing on "Nutritional Needs" inside the core Nursing Foundations curriculum. Delivered over a four-week period, the intervention comprised 12 instructional sessions conducted on alternate days (three sessions per week). Each 50-minute lecture followed a structured, four-phase timeline designed to re-energize cognitive focus:

- **Initial Instruction (20 minutes):** Delivery of core curricular content on Unit 1 (Nutrition) following standard lesson plans.
- **Mid-Session Engagement (5 minutes):** Introduction of a short, validated ice-breaking activity adapted from published educational literature (1).
- **Secondary Instruction (20 minutes):** Continuation of core didactic lecture content.
- **Terminal Engagement (5 minutes):** A final validated ice-breaking activity to consolidate session focus (1).

Student concentration was operationalized and measured using the validated Mizan-Meta Concentration Scale (2). This four-item instrument uses a 5-point Likert scale to produce a composite score ranging from 4 to 20, categorized into three distinct threshold levels: inadequate (< 5), moderate (6–12), and adequate (13–20). The scale was specifically administered to capture students' self-reported focus during the 50-minute lecture blocks. Baseline (pre-test) measurements were gathered prior to the four-week block. To minimize potential repeat-testing bias, post-intervention evaluations were recorded following a one-week washout period.

Statistical Analysis

Statistical processing was performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Continuous concentration metrics were evaluated for distributional assumptions using the Shapiro-Wilk test and reported as means and standard deviations (Mean $\pm$ SD). Paired Student's t-tests were conducted to evaluate mean changes in concentration scores from baseline to the one-week post-intervention follow-up. Statistical significance for all two-tailed tests was established a priori at $p < 0.05$.

Results

Baseline Demographic Profile of Participants

The analytical sample comprised 53 first-year B.Sc. Nursing students ($N = 53$). All participants (100) were aged between 17 and 20 years, with a predominant female representation (5.5%, $n = 40$). A majority belonged to nuclear family structures (88.7%, $n = 47$) and middle socioeconomic status (79.2%, $n = 42$), with 71.7 ($n = 38$) reporting a monthly family income below 25,000. The predominant religious affiliation was Hindu (86.8%, $n = 46$), and 60.4% ($n = 32$) resided in urban areas.

Regarding digital engagement, 92.5% ($n = 49$) reported active social media usage, with Instagram being the most frequently utilized platform (47.2%, $n = 25$). Over two-thirds of participants (64.2%, $n = 34$) spent 1–3 hours daily on social media platforms. Parental demographics revealed that most fathers (79.2%, $n = 42$) and mothers (66.0%, $n = 35$) were between 40 and 55 years of age. Primary education was completed by 52.8% ($n = 28$) of fathers and mothers alike. Professionally, 52.8% ($n = 28$) of fathers were privately employed, whereas 47.2% ($n = 25$) of mothers were homemakers (**Table 1**).

Table 1: Socio-Demographic Profile of Study Participants ($N = 53$)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age (years)	17–20	53	100.0
Gender	Female	40	75.5
	Male	13	24.5
Family Type	Nuclear	47	88.7
	Joint / Extended	6	11.3
Socioeconomic Status	Middle	42	79.2
	Low / Upper	11	20.8
Monthly Family Income	<₹25,000	38	71.7
	≥25,000	15	28.3
Residence	Urban	32	60.4
	Rural	21	39.6
Social Media Usage	Active User	49	92.5
	Non-User	4	7.5
Preferred Platform	Instagram	25	47.2
	Others	24	45.3
Daily Screen Time	1–3 hours	34	64.2
	<1 or >3 hours	15	28.3

Assessment of Pre-Test and Post-Test Concentration Levels

At baseline (pre-test), 73.6% (n = 39) of students exhibited an adequate level of concentration, while 26.4% (n = 14) demonstrated a moderate level. The mean baseline concentration score was 13.40 ± 1.94 .

Following the four-week intervention (12 sessions of structured ice-breaking activities), 100% (n = 53) of participants attained adequate concentration levels. The mean post-test concentration score increased to 17.94 ± 1.25 (Table 2).

Effectiveness of Ice-Breaking Activities on Concentration

A paired Student's t-test was conducted to evaluate the pedagogical impact of structured ice-breaking activities on student concentration. The mean concentration score significantly increased from pre-test 13.40 ± 1.94 to post-intervention follow-up (17.94 ± 1.25), yielding a mean absolute difference of 4.54 points. This increase was statistically highly significant ($t(52) = -16.05$, $p < 0.001$), demonstrating a robust positive effect on learning concentration (Table 2).

Table 2: Comparison of Pre-Test and Post-Test Concentration Scores (N = 53)

Assessment Phase	Mean Score	SD	Categorical Threshold, n (%)	Mean Difference	Paired t-value	p-value
Pre-Test	13.40	1.94	Moderate: 14 (26.4%) Adequate: 39 (73.6%)	—	—	—
Post-Test	17.94	1.25	Moderate: 0 (0.0%) Adequate: 53 (100.0%)	+ 4.54	-16.05	< 0.001*

*Statistically highly significant at $p < 0.001$; degrees of freedom $df = 52$.

Discussion

The empirical findings of this single-arm, quasi-experimental study demonstrate that the systematic integration of structured ice-breaking activities during core didactic sessions yields a statistically significant enhancement in learning concentration profiles among first-year nursing undergraduates. The post-intervention shift of the entire cohort (100%) into the adequate concentration' threshold underscores the practical utility of brief, low-stakes cognitive resets within demanding health sciences curricula.

The baseline metrics highlight a critical contemporary challenge in nursing education: over a quarter of the cohort (26.4%) exhibited moderate concentration levels at pre-test. This baseline attentional vulnerability aligns with global epidemiological data emphasizing that adolescents and late youth face complex environmental and psychosocial interactions that impact cognitive readiness (2, 3). In India, where 253 million adolescents constitute over a fifth of the national population—and over 70% reside in rural or transitioning urban areas—students entering higher education bring diverse socio-demographic backgrounds that influence learning dynamics (1, 3). In the present study, 92.5% of participants reported active daily social media consumption, supporting the premise that contemporary undergraduate cohorts enter clinical lecture halls with substantial pre-existing cognitive distractions (3, 4).

The primary statistical outcome—a significant upward shift in concentration scores from 13.40 ± 1.94 to 17.94 ± 1.25 ($t(52) = -16.05$, $p < 0.001$)—corroborates foundational literature demonstrating that structured ice-breaking activities serve as a powerful catalyst to overcome academic fatigue and expand attention spans in high-pressure nursing environments (4, 5). Specifically, our findings support recent educational trials showing that gamified micro-breaks deliver multidimensional student refreshment—simultaneously targeting cognitive, emotional, and physical domains to restore focus (5).

This marked statistical difference can be conceptualized through Sweller's Cognitive Load Theory (7). Prolonged, passive didactic instruction rapidly depletes working memory capacity, precipitating cognitive fatigue and attentional drift. By embedding structured, 5-minute active learning challenges into lecture blocks (e.g., auditory tracking or conceptual sorting), the instructional timeline effectively introduces a transient attentional reset. These micro-activities help mitigate extraneous cognitive load, stimulate neurological alertness, and prime working memory for processing subsequent core clinical concepts, such as therapeutic diet classifications.

Furthermore, the interactive nature of these activities addresses the emotional dimensions of clinical learning. According to Krashen's Affective Filter Hypothesis, situational anxiety and classroom boredom act as

psychological barriers that impair information processing (8). Gamified ice-breaking elements lower these affective barriers, fostering peer collaboration and strengthening instructor-student rapport. This relational optimization is particularly vital for first-year nursing students adapting to the complex terminology of introductory Nursing Foundations.

Limitations and Directives for Future Research

While the intervention demonstrated clear statistical efficacy, several methodological limitations warrant consideration. The single-arm, pre-test/post-test design without a parallel control group precludes complete isolation of threats to internal validity, such as the Hawthorne effect or natural historical maturation over the course block. Additionally, relying on a convenience sample from a single institution in Puducherry limits the direct generalizability of these findings to broader regional or national nursing populations.

Future educational research should employ multi-center, randomized controlled trials comparing content-related cognitive priming directly against non-content physical resets. Longitudinal tracking of knowledge retention through summative examination scores would further determine whether immediate improvements in concentration translate into long-term clinical competency.

Conclusion

The systematic integration of structured, validated ice-breaking activities into core nursing lectures offers an effective, low-resource pedagogical strategy to counteract classroom attentional decay. By embedding brief 5-minute cognitive resets within a traditional 50-minute instructional block, this study demonstrated a statistically significant improvement in learning concentration among first-year B.Sc. Nursing students ($p < 0.001$), elevating 100% of the participant cohort into the adequate concentration threshold post-intervention.

These findings suggest that addressing cognitive fatigue and digital distraction through active, gamified micro-interventions optimizes working memory capacity and reduces affective learning barriers in introductory health sciences education. Nursing educators and curriculum architects can seamlessly adapt this 20-5-20-5 instructional framework into dense clinical lecture blocks to foster sustained engagement, strengthen teacher-student rapport,

and create an energized environment conducive to complex clinical learning.

Declarations

Conflict of Interest The authors declare that there is no conflict of interest regarding the publication of this paper. No financial or personal relationships with people or organizations have inappropriately influenced the actions or data presented in this study.

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