RESEARCH REPORTS

# Effectiveness of Mind Mapping as an Instructional Approach to Increase Student Engagement and Motivation in Large Classroom Settings: A Study Among First-Year Nursing Students at The Maldives National University

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ABSTRACT *In large classes, maintaining student focus and motivation is often problematic. Traditional approach to lectures can lead to passive learning and less participation by students. This study proposes mind mapping as a potential solution, to assist a more engaging and motivating learning environment. Mixed-methods research was used in which both quantitative and qualitative approaches were applied. The forty-two first year nursing students in this school participated in the study with a division into experimental group using mind mapping while the other control group underwent traditional teaching. Engagement and motivation scores before and after intervention were quantified using standardized questionnaires whose data was analyzed on SPSS. It also involved thematic analysis of student feedback for further understanding. An increase in engagement scores was observed for those who participated in the experiment as opposed to those originating from the control population (P <. 05). The qualitative findings are presented also in 3 main categories: better understanding, more engagement, and higher motivation. The results, to the best of our knowledge, are the first of their kind in large class size to show that the students are even more engaged and more motivated in mind mapping as hypothesized. Teachers in large classroom environments could adopt some mind mapping in their teaching methods to help motivate students to participate more. The results of this study suggest that mind mapping holds promise as an instructional technique that can be used in large classrooms to positively affect student engagement and motivation. While future research could evaluate the lasting effects and the generalizability of mind mapping to different educational settings.*

*Keywords: Mind Mapping, Student Engagement, Motivation, Nursing Education, Large Classroom Settings*

## Introduction

In higher education, instructors continuously explore innovative teaching strategies to enhance student engagement and motivation, especially in large classroom settings where traditional methods often fall short. Among these strategies, mind mapping has gained attention as a creative, visual tool that aids in organizing and retaining information (Buzan, 2006). Mind mapping is defined as a non-linear, graphical technique of representing concepts and their interrelationships. Typically, it begins with a central idea, branching out into related subtopics and supporting details using keywords, images and colors. This technique encourages active

ISSN 2308-5959/20251231 

processing of information, supports conceptual learning and enhances memory. At the School of Nursing, Maldives National University (MNU) large classrooms sometimes exceeding 100 students per subject especially in foundational level subjects like NUR175 Introduction to Evidence-Based Practices pose a significant challenge for both educators and learners. As of 2024, the first-year students enrolled for this subject included approximately 120 students, often seated in auditoriums that limit opportunities for meaningful student-teacher interactions and reflective thinking – elements that are often missing in large lecture setting (Becker et al., 2021).

## Background and Rationale

Large classroom teaching in higher education presents various challenges including limited feedback opportunities, reduced participation and increased cognitive load on students (Mulryan-Kyne, 2010).

Nursing students are expected to comprehend, synthesize, and apply large volumes of information, often under time constraints, making traditional teaching strategies less effective. These challenges affect not only their classroom performance but also their clinical decision-making abilities. According to Eppler (2006), mind maps serve as cognitive scaffolds that help students navigate complex ideas by visually organizing key concepts and their relationships. This is especially beneficial in domains like nursing, where students must integrate theoretical knowledge with practical application. Similarly, Budd (2004) emphasized that mind mapping encourages deeper learning, fosters creativity, and motivates learners to engage actively with content. Research in higher education supports the benefits of active learning strategies, including concept mapping, case-based learning, and mind mapping, as effective tools to improve both engagement and comprehension in large classrooms (Michael, 2006; Prince, 2004). Furthermore, Astriani et al. (2020) demonstrated that students exposed to mind mapping techniques showed higher knowledge retention and better organization of ideas than those taught through traditional lectures. Despite its potential, mind mapping is not yet widely used at the School of Nursing, MNU, and its effects in large lecture environments remain underexplored.

This study seeks to fill that gap by critically examining whether integrating mind mapping into teaching practices can improve engagement, motivation, and learning outcomes for nursing students.

## Research Aim and Objectives

This study aimed to evaluate the effectiveness of mind mapping as an instructional strategy to enhance student engagement and motivation among first-year nursing students in a large classroom setting at the Maldives National University.

### Research Objectives

- To assess whether mind mapping increases student participation and attentiveness during lectures.
- To compare the motivation levels of students taught using mind mapping and those taught using traditional methods.

- To explore students' perceptions of mind mapping as a learning strategy in a large classroom environment.

## Significance of Study

The significance of this study lies in its potential to inform teaching practices in large lecture environments, particularly in nursing education, where students must master complex and interrelated concepts under high-pressure settings. Nursing students at MNU face difficulties in retaining information, linking theory to practice, and remaining actively engaged in lectures dominated by one-way communication.

By integrating mind mapping into large classroom instruction, educators can simplify abstract and complex ideas into more digestible and visually structured content. They further can promote active and reflective learning, which is essential for building critical thinking skills. It also reduces cognitive overload by organizing learning material in a way that mirrors how the brain naturally processes information (Buzan, 2006; Eppler, 2006). Furthermore, this study contributes to the limited literature on the application of mind mapping in higher education contexts within the Maldives and offers practical recommendations for nursing educators seeking to enhance student outcomes in large-group teaching. In addition to enhancing teaching effectiveness at MNU, the findings of this research may be applicable to similar higher education institutions facing challenges related to class size, engagement, and teaching quality in low-resource or developing contexts.

## Literature Review

Learning is an active, internal process in which new information is integrated with prior knowledge to create meaningful understanding. According to Ausubel (1968, as cited in Safdar et al., 2013), prior knowledge is the most significant determinant of learning. Effective instruction, therefore, should connect new ideas with existing cognitive structures. Supporting this view, Schröder et al. (2017) describe mind mapping as a form of visual notation that helps learners organize information based on personal preferences, thus enhancing comprehension and memory. Traditional, lecture-based teaching methods often fail to promote such cognitive integration, particularly in large-classroom contexts. Consequently, educators must adopt innovative and student-centered strategies that foster attention, motivation, and engagement (Schroeder et al., 2018, Shi et al.,2023). Arulselvi (2017) highlights mind mapping as one such strategy capable of improving academic performance through increased learner involvement. Although the existing body of literature contains limited quantitative evidence, early empirical findings point to the value of mind mapping in enhancing educational outcomes, particularly in higher education settings such as nursing education.

### Constructivist Theory in Education

Mind mapping is rooted in constructivist theory, which emphasizes that learners build new knowledge by connecting it with prior experiences. Piaget (1964) theorized that cognitive development progresses in a sequence of stages, each of which must be completed before higher-order thinking can be achieved. Dewey (1938) extended this idea by advocating child-centered pedagogy, while Farag et al. (2021) emphasizes that  Freire (1970) highlighted empowering learners

through active participation and reflection. According to Bryce and Blown (2023) curriculum content should act as a stimulus for personal meaning-making, which aligns with Ausubel's (1968) idea that meaningful learning occurs when new information is connected to existing knowledge. Mind mapping supports this process by prompting learners to retrieve and activate prior knowledge as they visually structure new concepts (Safdar et al., 2012).

## Cognitive Learning Theory

Cognitive learning theory views learning as an active mental process shaped by both internal mechanisms and environmental stimuli.

Davies (2010) argue that meaningful learning arises from the organization of knowledge into structured and retrievable formats. Mind maps provide a framework for students to integrate, categorize, and retrieve information more efficiently. Cañas et al. (2003) introduced IHMC CmapTools, a digital platform that facilitates the creation of concept maps to enhance comprehension and recall. Erdem (2017), in a qualitative study, found that mind mapping helped university students visually organize their thoughts, improving clarity and retention. However, Shin et al. (2023), in a meta-analysis of 21 studies, reported mixed results regarding mind mapping's mnemonic value, suggesting a need for further domain-specific investigations.

## Mind Mapping as a Learning Tool

### *Cognitive Benefits*

Mind maps are effective tools for promoting cognitive engagement. Arulselvi (2017) describe mind maps as graphic organizers that promote clarity and understanding by facilitating hierarchical representation of complex information. This is particularly beneficial in nursing education, where students must comprehend intricate concepts and procedures. Khajeloo & Siegel (2022) also emphasize that the visual nature of mind maps improves recall and enhances comprehension. Traditional linear notetaking lacks the flexibility and creativity of mind maps, which are more intuitive and learner-centered (Arulselvi, 2017; Safdar et al., 2013). Mind mapping's organic structure allows learners to brainstorm, re-organize ideas, and form meaningful connections.

### *Collaborative and Cooperative Learning*

Mind mapping also aligns with cooperative learning strategies, promoting teamwork, accountability, and shared understanding. Buzan (2006), in The Mind Map Book, notes that mind mapping supports positive interdependence in group learning. This is particularly relevant in nursing education, where collaboration is essential for clinical success. Historically, visual tools have aided learning; for instance, Aristotle used diagrammatic representations ("Icos") for memorization and idea structuring (Falcon, 2005).

### *Applications for Nursing Education*

Mind mapping has proven particularly effective in the context of nursing education. Erdem (2017b) and Shi et al. (2022) found that nursing students using mind maps were more engaged, better able to manage information, and showed improved understanding of complex topics. Dhindsa et al. (2010) found that students taught

through visual mind mapping developed richer cognitive structures compared to those taught using conventional methods. Similarly, Yarmohammadi et al. (2023) noted increased cognitive and emotional engagement among learners using mind mapping.

**Motivation and Engagement in Education**

Student engagement and motivation are crucial in large classroom environments. Merchie et al. (2022)found that mind maps cater to various learning styles through their multimodal and visual characteristics, helping maintain attention and interest. Unlike rigid concept maps, mind maps are more flexible, allowing for a more personalized learning experience. According to Buzan (2006), mind mapping enhances critical thinking, memory retention, and creativity. These elements contribute to sustained motivation and improved academic outcomes. Buskist and Groccia (2011) and Lin et al. (2022) also highlight that learner-centered approaches like mind mapping improve self-efficacy and student engagement, especially in challenging learning environments such as those encountered in nursing programs.

**Empirical Evidence and Practical Implications**

Multiple empirical studies underscore the practical benefits of mind mapping. Murtiningsih et al. (2022) reported that students found mind mapping helpful for understanding and time management, although some experienced initial difficulty adapting to the method. Wang et al. (2023), through a quasi-experimental study, demonstrated that mind mapping improved nursing students' communication skills and understanding of patient education. Lin et al. (2023) highlighted its importance in the ideation phase, particularly in creative and diagnostic thinking. He et al. (2024a) explored its use among medical students and concluded that mind mapping improved diagnostic skills and increased student engagement. These findings confirm the method's value in both theoretical and clinical settings.

Despite strong theoretical support, more robust and context-specific research is needed to validate the long-term cognitive and motivational impacts of mind mapping in higher education and nursing programs. As emphasized by Schroeder et al. (2017a) and Shi et al. (2023), future studies should explore variables such as discipline, instructional design, and learner background.

This literature review has explored the theoretical underpinnings and practical applications of mind mapping as an instructional strategy. Organized around constructivist and cognitive learning theories, the review has shown how mind mapping promotes active learning, conceptual clarity, and student motivation, particularly in large classrooms. While current research presents encouraging evidence, literature remains limited in scope, especially within the field of nursing education. Future studies should focus on strengthening thematic integration, using di- verse learner populations, and employing rigorous research designs to validate mind mapping's effectiveness in different educational contexts. Mind mapping offers a valuable and accessible approach to improving learning outcomes, especially for first-year nursing students navigating complex curricula and crowded classrooms. As educators continue to seek innovative methods for engagement and understanding, mind mapping stands out as a promising strategy

with both theoretical and empirical support.

## Methodology

This capstone project, entitled "The Effectiveness of Mind Mapping in Large Classroom Settings in the School of Nursing Maldives," employs a mixed-methods action research design. The integration of both qualitative and quantitative data collection and analysis allows for a comprehensive examination of the impact of mind mapping on student motivation, engagement, and learning outcomes. Action research is particularly appropriate for educational settings as it follows iterative cycles of planning, acting, observing, and reflecting, thereby allowing for continuous improvement (Araya, 2024).

### Research Design

The mixed-methods approach facilitates the triangulation of data sources to improve the validity and depth of findings (Creswell &Clark, 2017). Quantitative components, including pre- and post-intervention surveys and quizzes, provide measurable insights into student motivation, engagement, and academic performance. Qualitative components such as focus groups, semi-structured interviews, and classroom observations offer rich, contextual understanding of student experiences. The data collected from both strands will further be analyzed separately and then synthesized to draw comprehensive conclusions.

### Participants and Sampling

The study involved 42 undergraduate nursing students from a cohort out of 120 students enrolled at the School of Nursing, Maldives National University. These 42 students were selected based on their voluntary consent to participate in the research. The final sample size was shaped by both ethical consideration and logistical feasibility.

A purposive sampling strategy was employed to ensure the inclusion of students with diverse academic standings and learning preferences, thereby capturing a broad spectrum of experiences (Patton, 2014). Participants were further categorized into experimental and control groups with 21 students in each group. The experimental group explained the use of mind mapping as a teaching learning strategy while the control group continued with conventional instructional methods.

The intervention involved structured session incorporating mind mapping techniques to support active learning, critical thinking and improved content retention. These sessions were conducted over a specified period and integrated into the regular course delivery of the experimental group.

To complement the quantitative data, qualitative methods were employed to gain deeper insights into student's learning experiences. Two focus groups discussions (one per group), each consisting of 6-8 students were conducted to explore perceptions of the teaching methods. Additionally, six students (three from each group) were selected for semi-structured interviews based on their engagement levels and willingness to participate. Classroom observations were carried out during the intervention to document student interaction, engagement and overall learning environment.

While the relatively small size limits the generalizability of the findings, the

use of methodological triangulation strengthens the validity and depth of the study. These limitations and their implications will be critically addressed in the discussion.

## Data Collection Methods

Surveys, Pre and Post intervention surveys were administered in online formats. The survey tool includes 5-point Likert-scale items assessing motivation (e.g. willingness to participate), engagement (e.g. attention and interest) and perceptions of mind mapping. Open-ended questions were also included. The survey instrument was pilot tested on a small group of students and reviewed by an academic expert for face and content validity.

### Quizzes

Three quizzes were administered: one prior to the intervention, one mid-way through the semester, and one at the end. These quizzes were aligned with course content and learning outcomes and will assess recall, application, and synthesis of nursing concepts.

### Focus Group Discussions

Three focus group discussions, each comprising 5–7 participants, were conducted post-intervention. A semi-structured guide facilitated discussion, with questions designed to explore experiences with mind mapping, perceived effectiveness, and preferences.

### Interviews

Individual, non-scripted interviews were conducted with a subset of students selected from the focus groups. Non-scripted interviews allowed for more organic and nuanced exploration of individual experiences. Interviews were audio-recorded, transcribed verbatim, and anonymized.

### Observations

Classroom observations were conducted by the lead researcher. A structured observation checklist was used to document specific student behaviors, including note-taking methods, engagement levels, and participation.

Field notes were compiled weekly during the 10-week intervention period.

### Procedure

- Week 1–2: Develop and pilot survey instruments, quizzes, interview/focus group guides, and observation protocols. Obtain ethics approval.
- Week 3: Administer baseline surveys and quizzes.
- Week 4–8: Conduct intervention using mind mapping as a primary instructional strategy in selected sessions. Concurrent observations will be made.
- Week 9: Conduct post-intervention surveys, quizzes, focus groups, and interviews.
- Week 10: Analyze data and reflect on findings. Data Analysis. Quantitative Data: SPSS (Version 27) will be used to calculate descriptive statistics (mean,

median, SD). Paired sample t-tests and repeated-measures ANOVA will be conducted to assess changes in engagement, motivation, and quiz scores. Significance will be set at $p < 0.05$ (Engman, 2011).

### Qualitative Data

Braun and Clarke's (2006) six-phase thematic analysis framework will be employed. Transcripts from interviews and focus groups will be coded line-by-line to identify recurring themes. Triangulation was achieved by comparing findings from interviews, focus groups, and observation notes. Member checking and peer debriefing will be used to improve trustworthiness (Schwandt et al., 2007).

### Validity and Reliability

#### *Quantitative Validity*

Cronbach's alpha was calculated to assess internal consistency of survey items. Instruments were reviewed by three nursing education experts to ensure content validity. Credibility was established through triangulation, member checking, and rich description. Transferability was supported by detailed context descriptions, and dependability were enhanced through an audit trail.

### Ethical Considerations

All participants were informed about the study's aims and procedures and sign written in- formed consent forms (Nusbaum et al., 2017). Participation was voluntary, and students may withdraw at any time without consequences. Data were anonymized, stored securely, and accessed only by the research team.

## Discussions

The analysis of quantitative data shows significant increases in engagement, motivation, and learning outcomes following the intervention. Paired sample t-tests reveal that mean engagement scores increased from $M = 3.1$ ($SD = 0.5$) to $M = 4.2$ ($SD = 0.3$), $t(41) = 6.45$, $p < 0.001$.

Motivation scores improved from $M = 3.0$ ($SD = 0.6$) to $M = 4.1$ ($SD = 0.4$), $t(41) = 6.02$, $p < 0.001$. Quiz scores improved significantly, from a pre-test mean of 62% to a post-test mean of 78%, $F(2, 82) = 15.63$, $p < 0.001$. Thematic analysis of qualitative data revealed six primary themes.

### Theme 1: Improved Engagement and Interest

Students reported increased attention and participation during lessons involving mind maps. "Mind maps made my lectures very interactive and fun. I found myself more attentive in class." (Participant 3)"It was much easier for me to follow along with lectures when they were presented using mind maps." (Participant 8). Mind mapping transformed passive observation into active participation, setting the stage for deeper understanding.

### Theme 2: Enhanced Understanding and Recall

Students highlighted improved content retention and ability to connect complex ideas. "I managed to organize information better while creating mind maps, which helped me recall it during exams." (Participant 15). "I discerned links between different subjects, which made under- standing material easier." (Participant 21).

This deeper processing of information bridged theoretical knowledge and clinical relevance.

**Theme 3: Increased Motivation and Active Participation**

Students felt empowered to contribute and remain engaged throughout the lessons. "Using mind maps during our lessons made me want to participate more actively." (Participant 12)"This encouraged me to talk more about what we learned." (Participant 26). The ownership of learning through visual tools encouraged sustained motivation.

**Theme 4: Challenges with Initial Implementation**

Some students found mind mapping difficult at first. "Initially, I had a hard time creating mind maps because it was a new concept to me. "Despite these challenges, most participants adapted and reported improvements over time.

**Theme 5: Preference for Visual Learning Tools**

Students with visual learning preferences found mind maps particularly effective. "Mind maps were very effective for me compared to linear notes because I am a visual learner." (Participant 7) This aligns with visual-spatial intelligence as defined by Sentyawati (2022)

**Theme 6: Practical Applications and Real-World Benefits**

Students saw the value of mind mapping beyond academics. "I started using mind maps for planning my assignments and projects." (Participant 5)"For patient care planning, mind mapping would be an essential skill" (Participant 11).

These findings suggest that mind mapping nurtures transferable skills applicable in nursing practice. Overall, the results support the effectiveness of mind mapping as a teaching tool in large classroom settings. The findings are consistent with prior research (He at al., 2024b; Alemdag & Erdem 2017) and underscore the importance of incorporating structured, visual learning strategies to improve student outcomes in nursing education.

**Implications for Practice**

**Integration of Mind Mapping in Curriculum**

Given the positive impact of mind mapping on student engagement, comprehension, and retention, nursing educators should embed this technique into course instruction. Mind mapping can be integrated into lectures, collaborative group work, reflective exercises, and clinical case analyses to foster meaningful learning connections and boost academic performance.

**Professional Skill Development**

Mind mapping equips students with organizational and planning skills essential for clinical tasks such as patient care planning, report writing, and decision-making. Embedding mind mapping into clinical modules and simulations can foster real-world application, preparing students for professional nursing roles.

**Training and Support**

The initial challenges reported by students highlight the need for proper orientation.

Faculty should organize hands-on training workshops at the beginning of the semester to introduce the purpose, technique, and tools of mind mapping.

Sustained instructional support, including formative feedback, access to digital mind-mapping tools, and encouragement for experimentation, will help students refine their skills. Creating a psychologically safe classroom that encourages creativity can further support this process.

### Assessment and Evaluation

Instructors can use mind maps as part of formative or summative assessment to evaluate how well students organize and integrate knowledge. Mind map- ping-based evaluations can assess concept mastery, critical thinking, and problem-solving skills. Incorporating mind mapping into assignments allows instructors to provide more targeted and formative feedback. Visual representation of student understanding helps identify learning gaps and guides timely interventions.

## Policy Implications

Policymakers should consider integrating mind mapping as a required learning tool in nursing education curricula. National nursing education frameworks can include mind mapping within pedagogical best practices. Institutions should invest in digital mind mapping tools, software licenses, and professional development resources to facilitate consistent adoption of this method. Teacher Training Programs and Faculty development programs should include training in mind mapping to ensure nursing educators are equipped to implement it effectively. This could be part of Continuing Professional Development (CPD) schemes. Certification programs or teaching excellence standards may include competence in using mind mapping or similar innovative strategies, promoting consistent instructional quality.

### Potential Improvements and Recommendations for Further Research

Long-term studies are needed to explore how mind mapping influences academic performance, clinical competence, and professional identity formation over time. Comparative research is recommended to evaluate the effectiveness of mind mapping versus other instructional strategies such as concept mapping, storytelling, or simulation-based learning.

### Diverse Educational Settings

Future studies should examine mind mapping within varied learning environments such as online, hybrid, and interprofessional settings. Research should explore how mind mapping affects different learning styles, including visual, auditory, and kinesthetic learners, and how it may be customized accordingly. Exploration of AI-enhanced or AR-supported mind mapping applications can provide innovative ways to make learning more interactive, adaptive, and student-centered. Further research can examine the most effective implementation strategies for integrating mind mapping, such as frequency, format, timing, and support mechanisms.

## Conclusion

This study investigated the effectiveness of mind mapping in large classroom settings at the School of Nursing in Maldives using a mixed-methods action

research approach. The findings demonstrated that mind mapping significantly enhanced student engagement, motivation, comprehension, and recall of complex nursing content. Students showed higher levels of attention and participation when mind map- ping was employed, aligning with Sanchiz et al. (2019) multimedia learning theory. Mind mapping was associated with better organization of content and knowledge retention, supporting findings by Buzan (2006) and Safdar et al. (2012). Students reported enhanced critical thinking and creativity when constructing mind maps, corroborating previous research (Schroeder et al., 2018).

## Limitations

With a sample of 42 students from a single institution, generalizability is limited. Further research into larger and more diverse samples is warranted. Some students found mind mapping initially difficult due to its complexity. This underlines the importance of structured training and gradual integration. The short-term nature of the study does not account for sustained outcomes. Longitudinal studies would provide insight into long-term effectiveness.

Mind mapping presents a transformative approach to nursing education that addresses the challenges of large classroom settings. It enhances learning outcomes, student motivation, and professional skill development. As a visual, student-centered strategy, it aligns well with the cognitive and constructivist learning theories.

This research adds empirical evidence to the growing literature on innovative teaching strategies in nursing education. It highlights the relevance of mind mapping in enhancing student engagement and provides practical guidance on its application in large class settings.

Educators are encouraged to adopt mind mapping not as an occasional technique but as a regular part of instructional practice. Faculty should receive professional development on effective mind mapping strategies, and institutions should prioritize its inclusion in curricula. Policymakers and administrators must support this innovation by providing necessary resources, training opportunities, and curricular space.

Mind mapping, when thoughtfully implemented, can bridge the gap between traditional didactic teaching and active, meaningful learning. By fostering visual thinking, organization, and creativity, it empowers nursing students to become confident, competent professionals.

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