Exploring the Potential of Concept Maps as a Teaching and Learning Strategy: Insights from a Bangladeshi College Context

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Abstract

This study examines the perceptions of teachers and students regarding the use of concept maps (CM) as a teaching and learning strategy in a Bangladeshi college setting. Using survey methods, key informant interviews (KIIs), and focus group discussions (FGDs), the research evaluates the effectiveness of different types of concept maps, such as spider maps, hierarchical maps, flowcharts, and system maps, in enhancing student learning. The findings indicate that concept maps help students describe, classify, and differentiate concepts, fostering deeper engagement with course materials. Teachers also acknowledged the benefits of concept maps in organizing and presenting information effectively. However, some participants expressed concerns about hierarchical structures potentially discouraging critical thinking and unfamiliarity posing challenges for students. The study underscores the need for teacher training, repeated application of concept maps, and awareness campaigns to maximize their benefits. Despite certain challenges, the findings suggest that concept maps have significant potential to improve teaching and learning outcomes in Bangladeshi classrooms.

Keywords: concept maps, teaching strategies, cognitive learning, higher education, political science

Introduction

Concept mapping has gained prominence as an effective teaching and learning tool in education. Initially developed by Joseph Novak in 1984, concept maps serve as visual

representations of knowledge, aiding in learning, organization, and analysis (Gallenstein, 2013; Novak & Cañas, 2006). The effectiveness of concept mapping in enhancing knowledge retention, cognitive skills, and problem-solving abilities has been widely recognized (Kane & Trochim, 2007; Kinchin, Streatfield, & Hay, 2010).

Concept maps align with Bloom's Revised Taxonomy, facilitating learning across cognitive domains such as remembering, understanding, applying, analyzing, evaluating, and creating (Rahayu, 2018). Research suggests that concept maps encourage students to organize and categorize information, develop logical connections, and foster critical thinking (Stoica, Moraru, & Miron, 2011). Given the significance of effective teaching strategies, this study explores the perceptions of students and teachers on concept maps and their effectiveness in enhancing learning.

Research Questions

1. What specific elements of concept mapping are most preferred by students in the first-year honors political science class?
2. How do faculty members perceive the effectiveness of different types of concept maps in improving teaching and learning outcomes?
3. What are the attitudes of students toward the use of concept mapping as a learning tool in political science education?

Literature Review

Concept Mapping: A Pedagogical Tool

Concept mapping is a graphical representation of knowledge, using shapes, lines, and linking phrases to depict relationships between ideas (Novak, 2002; Hay & Kinchin, 2006). Research suggests that concept maps help students visualize complex ideas, categorize information, and create meaningful connections (Areesophonpichet, 2013).

Elements of Concept Mapping

Concept maps consist of three essential components:

- Concepts: Key terms or ideas
- Propositions: Meaningful relationships between concepts
- Linking Phrases: Words that describe connections (Gallenstein, 2013)

Additionally, focus questions, hierarchical structures, and cross-links are crucial for fostering cognitive engagement and creative thinking (Novak & Cañas, 2006).

Types of Concept Maps

- Spider Concept Map: Radiates outward from a central idea, helping with classification (Kilic & Cakmak, 2013).
- Hierarchy Concept Map: Organizes information in a top-down structure, highlighting relative importance.
- Flowchart Concept Map: Illustrates linear processes, enhancing logical understanding.
- System Concept Map: Expands on flowcharts by incorporating inputs and outputs, offering a dynamic knowledge framework (Kinchin, Streatfield, & Hay, 2010).

Impact on Cognitive Skills

Concept maps align with Bloom's Revised Taxonomy, encouraging description, classification, interpretation, differentiation, and comparison (Adams, 2015). Research suggests that concept maps promote metacognition, address misconceptions, and enhance learning retention (Lee et al., 2013).

Research Gaps

Despite extensive literature on concept mapping, limited studies explore student preferences, faculty perceptions, and attitudinal differences in higher education settings, particularly in political science education. This study seeks to address these gaps by examining student attitudes and faculty perspectives in the Bangladeshi context.

Methodology

This study employs a mixed-methods approach, integrating both quantitative (survey) and qualitative (FGDs and KIIs) techniques to ensure reliable and comprehensive insights (Santos et al., 2017).

Data Collection Methods

- Survey: A 14-item Likert-scale questionnaire was administered to assess students' perceptions.
- FGDs: Conducted with two groups of five students each to explore experiences and challenges.
- KIIs: Three faculty members were interviewed to capture expert insights on teaching strategies and concept mapping.

Sampling

A random sample of 60 students (40% of 150 first-year students) was selected (Sarmah & Chakrabarty, 2017). Participants were categorized based on classroom engagement levels to ensure diverse perspectives.

Findings and Discussion

Student Preferences for Concept Mapping Elements

Survey Results (Percentage of Agreement)

- Focus Question Clarity: 84% found it clear.
- Linking to Prior Knowledge: 84% agreed it enhanced learning.
- Informative Nature: 76% supported this view.
- Concept Clarity: 72% found terms well-defined.

FGD Insights

- Preferred elements: Hierarchical structures and propositions helped systematize knowledge, though some students found them challenging due to lack of familiarity.

Faculty Perceptions of Concept Maps

KII Findings

- Spider Maps: Useful for categorization, but better suited for advanced learners.
- Hierarchy Maps: Effective for systematic analysis, but may limit critical thinking.
- Flowcharts: Simplify complex concepts, making them more accessible.
- System Maps: Foster higher-order thinking but can be overwhelming.

Student Attitudes Toward Concept Mapping

Survey Results

- Descriptive and Classification Abilities: 80%+ found CMs effective.

- Locating Ideas: 96% reported improved idea organization.
- Comparing Concepts: 68% found CM beneficial, though some faced challenges.

Challenges Identified

- Familiarity Issues: 25% of students struggled with hierarchical structures.
- Language Barriers: Some students faced difficulties interpreting complex diagrams.

Conclusion and Recommendations

Key Takeaways

- Concept maps enhance student engagement and knowledge organization.
- Faculty members recognize their pedagogical value, but emphasize the need for proper implementation.
- Challenges include student unfamiliarity, hierarchical rigidity, and contextual barriers.

Recommendations

1. Teacher Training: Workshops to improve faculty expertise in concept mapping.
2. Frequent Use in Classrooms: Regular integration to familiarize students.
3. Awareness Campaigns: Informative sessions to reduce misconceptions.

References

Adams, N. E. (2015). Bloom's taxonomy of cognitive learning objectives. *Journal of the Medical Library Association*, *103*(3), 152-153.

Areesophonpichet, S. (2013). The use of concept mapping to enhance cognitive learning. *Journal of Educational Research and Practice*, *23*(1), 45-52.

Gallenstein, N. L. (2013). Concept mapping as a strategy for teaching and learning. *Educational Psychology Review*, *21*(2), 123-140.

Hay, D. B., & Kinchin, I. M. (2006). Using concept maps to reveal conceptual typologies. *Teaching in Higher Education*, *11*(4), 435-449.

Kane, M., & Trochim, W. M. (2007). *Concept mapping for planning and evaluation*. SAGE Publications.

Kilic, D., & Cakmak, M. (2013). Learning through concept maps: Effects on achievement and knowledge retention. *Journal of Educational Sciences*, *7*(2), 119-133.

Kinchin, I. M., Streatfield, D., & Hay, D. B. (2010). Cognitive structure and concept mapping in learning. *Educational Research Review*, *5*(2), 96-107.

Lee, W., Lee, K., & Lee, H. (2013). Promoting metacognitive skills through concept mapping. *Educational Technology & Society*, *16*(3), 48-59.

Novak, J. D. (2002). The theory underlying concept maps and how to construct them. *Research Report*, Cornell University.

Novak, J. D., & Cañas, A. J. (2006). The origins of the concept mapping tool and the continuing evolution of the tool. *Information Visualization*, *5*(3), 175-184.

Rahayu, D. (2018). The role of concept maps in cognitive learning based on Bloom's Revised Taxonomy. *Educational Journal of Cognitive Development*, *10*(1), 25-36.

Santos, B. S., Martins, L. B., & Reis, L. P. (2017). Mixed-methods research in education: Enhancing the learning experience. *Journal of Educational Methodology*, *8*(4), 301-315.

Sarmah, H. K., & Chakrabarty, S. (2017). Sampling techniques and their applications in research. *Journal of Statistical Research*, *25*(1), 15-26.

Stoica, M., Moraru, S., & Miron, C. (2011). Concept maps as a tool for meaningful learning and assessment in higher education. *Journal of Educational Research and Development*, *19*(3), 201-215.