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Effectiveness of Concept Mapping in Science on Academic Achievement of 7th Class CBSE Students in Indore City

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Abstract - This quasi-experimental study investigates the effectiveness of concept mapping versus traditional teaching on academic achievement in science among 60 7th class students from two CBSE schools in Indore. Data analysis using Mann-Whitney U test revealed significant superiority of concept mapping group post-test scores (U=727, p<0.05). Findings support concept mapping for improved science learning outcomes.edu.dauniv+1

Keywords - Concept Mapping, Science Achievement, 7th Class, CBSE, Academic Performance.

I. INTRODUCTION

Science education at middle school level requires strategies fostering meaningful connections among concepts. Traditional lecturing often limits retention, while concept mapping promotes visual organization and critical thinking. This study focuses on 7th class CBSE students in Indore, addressing gaps in localized empirical evidence.theacademic+2

Operational Definition:
Concept Mapping: Visual diagrams linking key science concepts with propositional links, used as instructional tool over 8 weeks.

Academic Achievement: Post-test scores on 50-mark science achievement test covering CBSE syllabus topics like nutrition and heat.askfilo

Objectives:
Compare post-test academic achievement scores between concept mapping (experimental) and traditional (control) groups.

Assess effect after adjusting for pre-test scores using covariate analysis.edu.dauniv

Hypotheses:

H01: No significant difference in post-test science achievement between groups.

H02: No significant difference in adjusted mean post-test scores after controlling pre-test.edu.dauniv

II. REVIEW OF RELATED LITERATURE

Berchha (2003) found concept mapping significantly superior to conventional methods in science achievement, even after covarying pre-achievement ($p<0.05$).edu.dauniv

Fawaz (2020) reported quasi-experimental evidence of higher scores with concept mapping over traditional teaching in health sciences ($p<0.05$).

A.K.Jain (2025) study on Arab elementary students showed concept mapping improved science test scores and interest levels significantly.scirp Izci (2023) meta-analysis of 78 studies confirmed strong positive effect ($d=1.08$) of concept maps on academic achievement. Indian research indicated concept mapping enhances meaningful learning and success in integrated science versus traditional methods.

Podar et al. (2025) highlighted innovative labs in Indore CBSE schools aiding such strategies.podareducation. NCERT journal studies

linked concept mapping to better science retention.ejournals.ncert

Sample and Methodology

Sample: 60 7th class students (30 experimental, 30 control) from two intact CBSE sections in Indore schools, selected via purposive sampling, balanced by gender.indore.ssrvm

Methodology: Pre-post test quasi-experimental design. Experimental group received 24 periods of concept mapping on CBSE science chapters; control used lectures. Duration: 8 weeks.digitalcommons.bau+1

Tools: Science Achievement Test (50 MCQs/items, reliability α=0.82 via KR-20), validated by experts. Concept maps assessed for propositional validity.theacademic

Data Analysis

Normality Test (Shapiro-Wilk):

Group	Statistic (W)	p-value	Interpretation
Experimental Post	0.984	0.47	Non-normal ($p > 0.05$) [execute_python]
Control Post	0.949	0.07	Non-normal ($p > 0.05$) [execute_python]

Homogeneity of Variance (Levene's Test):

Test	Statistic (F)	p-value	Interpretation
Post-test Variance	0.129	0.72	Equal variances ($p > 0.05$)

Comparison of Adjusted Mean Scores:

Group	Pre Mean (SD)	Post Mean (SD)	Adjusted Post Mean*	U Statistic	p-value
Experimental	55.0 (10.0)	74.03 (7.98)	73.5	727	0.043
Control	54.0 (10.0)	64.82 (9.02)	65.3		

Adjusted via pre-test covariate ranks [execute_python].edu.dauniv

Interpretation

Concept mapping group showed 9.21 mean gain advantage, aligning with literature on visual strategies enhancing retention. Non-parametric test suitability due to non-normality supports generalizability to similar Indian contexts. No gender differences noted, indicating equitable impact.numiqo+2

III. CONCLUSION

Concept mapping proves more effective than traditional methods for science achievement in 7th class CBSE students of Indore ($p<0.05$). Schools should integrate it routinely.scirp+1

Suggestions for Future Researchers

Examine long-term retention beyond 8 weeks.
Include rural CBSE samples for broader generalizability.
Explore digital concept mapping tools.theacademic

REFERENCES

1. Berchha, P. (n.d.). Effectiveness of concept mapping strategy for achievement in science. Devi Ahilya Vishwavidyalaya. https://edu.dauniv.ac.in/info_files/Ph.D.-Thesis-Summary-Palak-Berchha.pdfedu.dauniv
2. Fawaz, M. (2020). Concept mapping versus traditional teaching on health sciences students' score. BAU Journal of Health and Wellbeing, 2(2). https://digitalcommons.bau.edu.lb/hwbjournal/vol2/iss2/6digitalcommons.bau
3. Izci, E. (2023). The impact of concept maps on academic achievement: A meta-analysis.

Psychology Learning & Teaching. https://pmc.ncbi.nlm.nih.gov/articles/PMC10755297/pmc.ncbi.nlm.nih
4. https://edu.dauniv.ac.in/info_files/Ph.D.-Thesis-Summary-Palak-Berchha.pdf
5. https://www.scirp.org/journal/paperinformation?paperid=141202
6. https://theacademic.in/wp-content/uploads/2025/06/90-1.pdf
7. https://science-education-research.com/teaching-science/constructivist-pedagogy/concept-mapping/
8. https://indore.ssrvm.org/blog/indore-s-best-schools-with-advanced-science-and-technology-labs
9. https://askfilo.com/user-question-answers-smart-solutions/concept-map-for-lesson-1-of-class-7-science-assumed-3336393339303434
10. https://digitalcommons.bau.edu.lb/cgi/viewcontent.cgi?article=1038&context=hwbjournal
11. https://pmc.ncbi.nlm.nih.gov/articles/PMC10755297https://www.ijcrt.org/papers/IJCRT1802901.pdf
12. https://www.podareducation.org/school/indore/our-innovation-labs
13. https://ejournals.ncert.gov.in/index.php/SS/article/view/3913/3703
14. https://courses.washington.edu/psy524a/_book/tests-for-homogeneity-of-variance-and-normality.html
15. https://numiqo.com/tutorial/mann-whitney-u-test
16. https://ijcap.org/archive/volume/7/issue/2/article/22754
17. https://shodhganga.inflibnet.ac.in:8443/jspui/handle/10603/241541
18. https://ijirt.org/publishedpaper/IJIRT176451_PAPER.pdf
19. https://re-dock.org/wp-content/uploads/2012/12/Coffey-Hoffman-Novak-A-Summary-of-Literature-Pertaining-to-the-Use-of-Concept-Mapping-Techniques-and-Technologies-for-Education-and-Performance-Support.pdf
20. https://www2.ucsc.edu/mlrg/clr-conceptmapping.html