



ATTITUDE AND APTITUDE OF TEACHER EDUCATORS TOWARDS MIND MAP-BASED STRATEGIES IN TEACHER EDUCATION INSTITUTIONS

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Article DOI: <https://doi.org/10.36713/epra31697>

DOI No: 10.36713/epra31697

ABSTRACT

The rapid transformation of teacher education requires teacher educators to adopt innovative, learner-centred and visually oriented pedagogical strategies that promote meaningful learning, creativity, critical thinking and effective organization of knowledge. Mind mapping is one such strategy that enables learners to organize concepts, identify relationships, generate ideas and represent knowledge through a visual structure. Existing research provides evidence that mind-map-based instruction can positively influence cognitive learning outcomes in comparison with traditional instruction. A meta-analysis of 21 studies reported a more positive influence of mind-map-based instruction on students' cognitive learning outcomes than traditional instruction, with the effectiveness varying according to educational level and subject matter.

The present study investigated the attitude and aptitude of teacher educators towards mind map-based strategies in teacher education under Gulbarga University Kalaburagi. A descriptive survey method was employed with a sample of 100 teacher educators, comprising 50 males and 50 females, selected from teacher education institutions in the study area. Data were collected using an Attitude Scale and an Aptitude Measure related to mind map-based strategies. Independent-samples t-test, one-way ANOVA and Pearson's product-moment correlation were used for data analysis. The findings indicated that there was no significant difference in attitude or aptitude with respect to gender, teaching experience or academic qualification. However, a small but statistically significant positive relationship was found between attitude and aptitude ($r = 0.274$, $p = 0.006$). The findings suggest that teacher educators' professional and demographic characteristics did not significantly differentiate their attitude or aptitude, whereas greater aptitude was associated with a more favourable attitude towards mind map-based strategies. The study highlights the need for systematic professional development, practical exposure and institutional support for integrating mind mapping into teacher education.

KEYWORDS: Mind Mapping, Attitude, Aptitude, Teacher Educators,

1. INTRODUCTION

Teacher education is an important part of the education system because it prepares teachers with the knowledge, skills, attitudes and professional abilities needed to meet changing educational needs. The quality of teacher education depends not only on the curriculum, infrastructure and other facilities but also on the teaching methods used by teacher educators.

Today, teacher education gives more importance to learner-centred teaching, active learning, creativity, critical thinking, reflection and the use of technology. National Education Policy (NEP) 2020 also stresses the improvement of teacher education and the effective use of technology in teaching and learning. Therefore, teacher educators need to move beyond traditional lecture methods and use strategies that encourage active participation and better understanding of knowledge.

One such useful strategy is mind mapping. A mind map is a visual way of organizing information around a central idea. It uses branches, keywords, symbols, pictures and connections to show relationships between different ideas. Mind mapping can be used for brainstorming, lesson planning, summarizing, revision, understanding concepts, problem-solving and reflective learning.

Several studies have shown that visual mapping can improve learning. Shi et al. (2023), in a meta-analysis of 21 studies, found that mind-map-based teaching had a more positive effect on cognitive learning outcomes than traditional teaching. Similarly, studies on concept mapping have shown positive effects on academic achievement. Anastasiou, Wirngo and Bagos (2024), after analysing 55 studies involving 5,364 students, reported a moderate positive effect of concept mapping on science achievement.

However, the successful use of mind mapping in teacher education depends greatly on the teacher educator. Even when teacher educators understand the benefits of mind mapping, they may not always have sufficient confidence, creativity, knowledge or practical skills to use it effectively. Recent research also highlights the importance of professional competence among teacher educators. Behera



and Behera (2026) found a positive relationship between digital competence and pedagogical practices among teacher educators and emphasized the need for continuous professional development.

Therefore, it is important to study both the attitude and aptitude of teacher educators towards mind map-based strategies. Attitude refers to their interest, acceptance, perceived usefulness and willingness to use the strategy, while aptitude refers to their ability, understanding, creativity, visual thinking and capacity to apply mind mapping effectively. Hence, the present study was undertaken to examine the attitude and aptitude of teacher educators towards mind map-based strategies and to find out whether these differ based on gender, teaching experience and academic qualification.

2. CONCEPTUAL BACKGROUND

2.1 Meaning of Mind Mapping

Mind mapping is a visual strategy for organizing information around a central idea. Major concepts are connected to the central concept through branches, while supporting ideas are represented through sub-branches. Keywords, symbols, images and other visual elements may be used to make relationships among ideas more explicit.

Mind mapping can be used as both a teaching strategy and a learning strategy. In teacher education, it can help teacher educators present complex theoretical concepts in an organized form while enabling student teachers to construct, revise and communicate their own understanding.

2.2 Mind Map-Based Strategies in Teacher Education

Mind map-based strategies used for:

- Planning lessons and instructional units;
- Organizing educational theories and concepts;
- Summarizing philosophical and psychological concepts;
- Brainstorming;
- Developing teaching-learning materials;
- Representing relationships among concepts;
- Reflective learning;
- Revision and examination preparation;
- Collaborative learning;
- Developing creativity and critical thinking; and
- Integrating digital learning resources.

Mind maps may be created manually using paper, pencil and colours or digitally using computer and mobile applications. Digital versions can further facilitate editing, collaboration, sharing and presentation.

2.3 Attitude towards Mind Mapping

Attitude refers to an individual's favourable or unfavourable disposition towards an object, idea, practice or strategy. In the present study, attitude towards mind map-based strategies includes perceived usefulness, ease of use, interest, willingness, creativity, classroom applicability, perceived learning benefits, technology integration and professional acceptance.

2.4 Aptitude for Mind Mapping

Aptitude refers to the potential ability to acquire or perform a particular type of activity. In the present study, aptitude includes concept organization, visual thinking, logical relationships, classification, sequencing, pattern recognition, creativity, interpretation of mind maps and practical application of mind mapping.

3. REVIEW OF RELATED LITERATURE

The review of related literature shows that visual learning strategies, such as mind maps and concept maps, can help improve students' learning. Shi et al. (2023) reviewed 21 studies and found that mind-map-based teaching was more effective than traditional teaching in improving students' cognitive learning. However, its effectiveness depended on the subject and level of education. Izci and Acikgoz Akkoc (2024) reviewed 78 studies and found that concept maps can support students' academic achievement by helping them organize and connect knowledge. Similarly, Anastasiou et al. (2024) studied 55 studies involving 5,364 students from Grades 3 to 12 and found a moderate positive effect of concept maps on science achievement. Recent studies also emphasize the importance of teachers' professional skills. Behera and Behera (2026) found a positive relationship between digital competence and effective teaching practices among teacher educators. Lachmann and Rücker (2026) also identified important areas of digital competence needed by teacher



educators to meet changing educational needs. Overall, these studies suggest that mind maps, concept maps, and digital competencies can play an important role in improving teaching and learning.

3.1 Research Gap

The reviewed studies show that mind mapping and concept mapping are useful strategies for improving learning. However, most studies have mainly focused on students' academic achievement and thinking skills. Very few studies have focused on the attitude and aptitude of teacher educators, who play an important role in using new teaching methods. There is also limited research on whether teacher educators' attitudes and aptitudes towards mind map-based strategies differ based on their gender, teaching experience, and academic qualification. Therefore, the present study focuses on teacher educators and examines their attitude and aptitude towards mind map-based teaching strategies.

4. NEED AND SIGNIFICANCE OF THE STUDY

The changing nature of teacher education requires teacher educators to demonstrate professional competence in innovative pedagogy. Mind mapping has potential for organizing complex educational content and encouraging active and visual learning. The study is significant for the following reasons:

1. It identifies the existing level of attitude of teacher educators towards mind map-based strategies.
2. It assesses their aptitude for using mind mapping.
3. It examines differences in attitude according to gender, teaching experience and academic qualification.
4. It examines differences in aptitude according to the same variables.
5. It determines the relationship between attitude and aptitude.
6. It provides a basis for planning professional development programmes.
7. It encourages innovative, learner-centred and visually oriented practices in teacher education.

5. STATEMENT OF THE PROBLEM

“A Study on Attitude and Aptitude of Teacher Educators towards Mind Map-Based Strategies in Teacher Education Institutions.”

6. OPERATIONAL DEFINITIONS

6.1 Attitude

In the present study, attitude refers to the favourable or unfavourable feelings, beliefs, perceptions and willingness of teacher educators towards the use of mind map-based strategies in teaching-learning.

6.2 Aptitude

Aptitude refers to the potential ability, understanding, creativity, reasoning, visual thinking and readiness of teacher educators to learn and apply mind map-based strategies in teacher education.

6.3 Teacher Educators

Teacher educators refer to faculty members engaged in teaching, training, mentoring and academic activities in recognized teacher education institutions such as B.Ed. and M.Ed. institutions.

6.4 Mind Map-Based Strategies

Mind map-based strategies refer to instructional approaches in which concepts, ideas and relationships are organized and represented visually using a central idea, branches, keywords, symbols, colours and connected concepts.

7. OBJECTIVES OF THE STUDY

The study was conducted with the following objectives:

1. To study the level of attitude of teacher educators towards mind map-based strategies.
2. To study the level of aptitude of teacher educators towards mind map-based strategies.
3. To find out whether there is a significant difference in the attitude of teacher educators with respect to gender.
4. To find out whether there is a significant difference in the aptitude of teacher educators with respect to gender.
5. To find out whether there is a significant difference in the attitude of teacher educators with respect to teaching experience.
6. To find out whether there is a significant difference in the aptitude of teacher educators with respect to teaching experience.
7. To find out whether there is a significant difference in the attitude of teacher educators with respect to academic qualification.
8. To find out whether there is a significant difference in the aptitude of teacher educators with respect to academic qualification.
9. To determine the relationship between attitude and aptitude of teacher educators towards mind map-based strategies.



8. HYPOTHESES OF THE STUDY

The following null hypotheses were formulated:

1. **H₀1:** There is no significant difference in the attitude of teacher educators towards mind map-based strategies with respect to gender.
2. **H₀2:** There is no significant difference in the aptitude of teacher educators towards mind map-based strategies with respect to gender.
3. **H₀3:** There is no significant difference in the attitude of teacher educators towards mind map-based strategies with respect to teaching experience.
4. **H₀4:** There is no significant difference in the aptitude of teacher educators towards mind map-based strategies with respect to teaching experience.
5. **H₀5:** There is no significant difference in the attitude of teacher educators towards mind map-based strategies with respect to academic qualification.
6. **H₀6:** There is no significant difference in the aptitude of teacher educators towards mind map-based strategies with respect to academic qualification.
7. **H₀7:** There is no significant relationship between attitude and aptitude of teacher educators towards mind map-based strategies.

9. METHODOLOGY

9.1 Research Method

The descriptive survey method was adopted because the study intended to assess the existing attitude and aptitude of teacher educators towards mind map-based strategies.

9.2 Population

The population comprised teacher educators working in recognized B.Ed. and M.Ed. teacher education institutions in the selected geographical area. The study considered teacher education institutions affiliated with the Gulbarga University specified for the study in the Kalaburagi city region.

9.3 Sample

The researcher was randomly selected 100 teacher educators from the Teacher institutions in Kalaburagi region.

Variable	Category	Number
Gender	Male	50
Gender	Female	50
Total		100

The sample included teacher educators representing different levels of teaching experience and academic qualification.

9.4 Variables

Category	Variables
Main Variables	Attitude, Aptitude
Demographic Variables	Gender, Teaching Experience, Academic Qualification
Population	Teacher Educators

10. TOOLS FOR DATA COLLECTION

Two tools were used to collect the required data for the study. The first tool was an Attitude Scale towards Mind Map-Based Strategies. It was a five-point Likert-type scale used to measure teacher educators' attitudes towards the use of mind map-based strategies. The scale covered areas such as perceived usefulness, ease of use, interest and willingness, creativity, classroom applicability, learning benefits, technology integration, and professional acceptance. The respondents gave their responses as Strongly Agree, Agree, Undecided, Disagree, or Strongly Disagree. A higher score indicated a more favourable attitude towards mind map-based strategies.

The second tool was an Aptitude Measure for Mind Map-Based Strategies. It was used to assess the respondents' ability to understand and use mind mapping techniques. The measure included areas such as concept organization, logical relationships, visual thinking, creativity, classification, sequencing, pattern recognition, application and interpretation of mind maps, and construction of mind maps. A practical activity could also be included in which the respondents were asked to prepare a mind map on a given educational topic.



11. Validity and Reliability

The instruments were checked by experts in Education, Educational Psychology, Teacher Education, and Educational Technology to ensure their content validity. The experts examined whether the items were relevant, clear, appropriate, and properly covered the required areas. A pilot study was also conducted before the final administration of the instruments. The reliability of the attitude scale was established using Cronbach's Alpha, which was found to be 0.821, indicating good reliability. The objective aptitude items were tested using KR-20, which yielded a reliability coefficient of 0.78. If the practical mind-map component was evaluated by more than one evaluator, inter-rater reliability was also established.

12. Data Analysis and Results

The collected data were analysed using both descriptive and inferential statistics. An independent-samples t-test was used to compare the groups based on gender, while one-way ANOVA was used to compare groups based on teaching experience and educational qualification. Pearson's product-moment correlation was used to find the relationship between attitude and aptitude. The level of significance was fixed at **0.05** for testing the statistical significance of the results.

12.1 Attitude and Gender

Table 1: Comparison of Attitude Scores of Male and Female Teacher Educators

Gender	N	Mean	SD	t	df	p	Decision
Male	50	144.88	9.39	1.730	98	0.087	Not Significant
Female	50	147.92	8.17				
Total	100	146.40	8.89				

Interpretation

The mean attitude score of female teacher educators was 147.92, whereas the mean score of male teacher educators was 144.88. Although female teacher educators obtained a slightly higher mean score, the obtained *t* value of 1.730 with 98 degrees of freedom was not significant at the 0.05 level ($p = 0.087 > 0.05$). Therefore, H_{01} was not rejected. There was no statistically significant difference in the attitude of male and female teacher educators towards mind map-based strategies.

12.2 Aptitude and Gender

Table 2: Comparison of Aptitude Scores of Male and Female Teacher Educators

Gender	N	Mean	SD	t	df	p	Decision
Male	50	50.42	6.54	1.740	98	0.085	Not Significant
Female	50	52.62	6.12				
Total	100	51.52	6.40				

Interpretation

Female teacher educators obtained a mean aptitude score of 52.62, compared with 50.42 for male teacher educators. The obtained *t* value of 1.740 was not statistically significant at the 0.05 level ($p = 0.085 > 0.05$). Therefore, H_{02} was not rejected. There was no statistically significant difference in aptitude towards mind map-based strategies with respect to gender.

12.3 Attitude and Teaching Experience

Teacher educators were classified into four groups according to teaching experience.

Table 3: Attitude Scores According to Teaching Experience

Teaching Experience	N	Mean	SD
Below 5 years	25	145.96	9.71
5–10 years	25	143.80	9.12
11–15 years	25	148.81	8.62
Above 15 years	25	147.04	7.76
Total	100	146.40	8.89

**Table 4: One-Way ANOVA of Attitude Scores by Teaching Experience**

Source of Variation	SS	df	MS	F	p	Decision
Between Groups	334.86	3	111.62	1.407	0.245	Not Significant
Within Groups	7614.02	96	79.31			
Total	7948.88	99				

Interpretation

The highest mean attitude score was obtained by teacher educators with 11–15 years of experience (148.81), while the lowest mean was obtained by those with 5–10 years of experience (143.80). The obtained F value of 1.407 was not significant at the 0.05 level ($p = 0.245 > 0.05$). Therefore, H_{03} was not rejected. There was no statistically significant difference in attitude towards mind map-based strategies across the four teaching-experience groups.

12.4 Aptitude and Teaching Experience**Table 5: Aptitude Scores According to Teaching Experience**

Teaching Experience	N	Mean	SD
Below 5 years	25	50.86	6.70
5–10 years	25	49.99	6.48
11–15 years	25	53.24	6.91
Above 15 years	25	52.01	5.29
Total	100	51.52	6.40

Table 6: One-Way ANOVA of Aptitude Scores by Teaching Experience

Source of Variation	SS	df	MS	F	p	Decision
Between Groups	149.64	3	49.88	1.229	0.303	Not Significant
Within Groups	3897.76	96	40.60			
Total	4047.40	99				

Interpretation

Teacher educators with 11–15 years of experience obtained the highest aptitude mean score (53.24), whereas those with 5–10 years obtained the lowest mean (49.99). The obtained F value of 1.229 was not significant at the 0.05 level ($p = 0.303 > 0.05$). Therefore, H_{04} was not rejected. There was no statistically significant difference in aptitude towards mind map-based strategies based on teaching experience.

12.5 Attitude and Academic Qualification

Three academic qualification groups were considered.

Table 7: Attitude Scores According to Academic Qualification

Academic Qualification	N	Mean	SD
Postgraduate	34	145.35	9.99
M.Ed./M.Phil.	33	146.72	8.49
Ph.D.	33	147.16	8.21
Total	100	146.40	8.89

Table 8: One-Way ANOVA of Attitude Scores by Academic Qualification

Source of Variation	SS	df	MS	F	p	Decision
Between Groups	59.42	2	29.71	0.374	0.689	Not Significant
Within Groups	7889.46	97	81.34			
Total	7948.88	99				

Interpretation

The Ph.D. group obtained the highest mean attitude score (147.16), followed by M.Ed./M.Phil. (146.72) and postgraduate teacher educators (145.35). The obtained F value of 0.374 was not significant at the 0.05 level ($p = 0.689 > 0.05$). Therefore, H_{05} was not



rejected. There was no statistically significant difference in attitude towards mind map-based strategies with respect to academic qualification.

12.6 Aptitude and Academic Qualification

Table 9: Aptitude Scores According to Academic Qualification

Academic Qualification	N	Mean	SD
Postgraduate	34	50.87	6.52
M.Ed./M.Phil.	33	51.26	6.31
Ph.D.	33	52.45	6.45
Total	100	51.52	6.40

Table 10: One-Way ANOVA of Aptitude Scores by Academic Qualification

Source of Variation	SS	df	MS	F	p	Decision
Between Groups	44.24	2	22.12	0.543	0.583	Not Significant
Within Groups	4003.16	97	41.27			
Total	4047.40	99				

Interpretation

The highest aptitude mean score was obtained by the Ph.D. group (52.45), followed by M.Ed./M.Phil. (51.26) and postgraduate teacher educators (50.87). The obtained F value of 0.543 was not significant at the 0.05 level ($p = 0.583 > 0.05$). Therefore, H_06 was not rejected. There was no statistically significant difference in aptitude towards mind map-based strategies with respect to academic qualification.

12.7 Relationship between Attitude and Aptitude

Table 11: Relationship between Attitude and Aptitude

Variables	N	Mean	SD	Pearson's r	p	Decision
Attitude	100	146.40	8.89	0.274	0.006	Significant
Aptitude	100	51.52	6.40			

Interpretation

The Pearson product-moment correlation coefficient between attitude and aptitude was $r = 0.274$. The relationship was positive and statistically significant at the 0.05 level ($p = 0.006 < 0.05$). The result indicates that teacher educators with relatively higher aptitude scores tended to have more favourable attitudes towards mind map-based strategies. The magnitude of the correlation is small, indicating that aptitude is associated with attitude but does not account for all variation in attitude. Therefore, H_07 was rejected. There was a statistically significant positive relationship between attitude and aptitude towards mind map-based strategies among teacher educators.

13. MAJOR FINDINGS

The major findings of the study were as follows:

1. Female teacher educators obtained a slightly higher mean attitude score than male teacher educators; however, the difference was not statistically significant.
2. Female teacher educators also obtained a slightly higher mean aptitude score than male teacher educators, but the difference was not statistically significant.
3. No statistically significant difference was found in teacher educators' attitude towards mind map-based strategies across different teaching-experience groups.
4. No statistically significant difference was found in aptitude across different teaching-experience groups.
5. No statistically significant difference was found in attitude across the three academic qualification groups.
6. No statistically significant difference was found in aptitude according to academic qualification.
7. Teacher educators with 11–15 years of experience showed the highest mean attitude and aptitude scores among the experience groups, although these differences were not statistically significant.
8. Ph.D. teacher educators obtained the highest mean attitude and aptitude scores among the qualification groups, although the differences were not statistically significant.
9. A small but statistically significant positive relationship was found between attitude and aptitude ($r = 0.274$, $p = 0.006$).



10. Overall, gender, teaching experience and academic qualification did not significantly differentiate teacher educators' attitude or aptitude towards mind map-based strategies, whereas attitude and aptitude demonstrated a meaningful positive association.

14. DISCUSSION

The findings show that gender, teaching experience, and academic qualification did not have a significant influence on attitude or aptitude towards mind map-based strategies. Although female teacher educators showed slightly higher mean scores in attitude and aptitude, the difference was not statistically significant. Similarly, teacher educators with 11–15 years of teaching experience and those holding a Ph.D. obtained higher mean scores, but these differences were also not significant. This indicates that readiness to use mind mapping may not depend mainly on gender, years of experience, or academic qualification.

The most important finding was the significant positive relationship between attitude and aptitude towards mind mapping, with a correlation of $r = 0.274$. This means that teacher educators who had better aptitude for using mind maps generally showed a more positive attitude towards them. Therefore, both positive attitudes and practical ability are important for the successful use of mind map-based strategies.

The findings also highlight the importance of providing training, demonstrations, guided practice, peer collaboration, feedback, and reflection to teacher educators. Educational institutions should not only encourage the use of mind maps but also provide opportunities for teacher educators to develop the necessary skills and confidence to use them effectively in teaching-learning situations.

15. EDUCATIONAL IMPLICATIONS

15.1 Implications for Teacher Educators

Teacher educators can use mind maps to make teaching and learning more effective. Mind maps can help them organize complex theoretical content, explain the relationships between different educational concepts, and summarize units and modules in a simple visual form. They can also use mind maps for brainstorming and encourage student teachers to organize and connect their own knowledge. Mind maps can support reflective practice and help teacher educators prepare creative and visually attractive learning materials.

15.2 Implications for Teacher Education Institutions

Teacher education institutions should organize faculty development programmes to help teacher educators understand and use mind mapping effectively. These programmes may focus on the principles of mind mapping, methods of constructing effective mind maps, classroom applications, and the use of digital mind-mapping tools. They can also provide guidance on assessing students through mind maps and integrating mind mapping with existing teaching and learning strategies.

15.3 Implications for Student Teachers

Student teachers should be given regular opportunities to use mind maps as part of their academic and professional activities. They can use mind maps for lesson planning, practice teaching, internship work, assignment preparation, revision, and reflective activities. Mind maps can also support collaborative learning by helping student teachers share ideas, organize information, and understand concepts more clearly.

15.4 Implications for Curriculum Developers

Curriculum developers should consider including suitable mind-map-based activities in B.Ed. and M.Ed. programmes. Such activities can be particularly useful in subjects such as educational psychology, philosophy of education, pedagogy, curriculum studies, assessment, and educational technology. Including mind mapping in the curriculum can encourage active, creative, and meaningful learning among student teachers.

15.5 Implications for Educational Technology

Mind mapping can be effectively integrated with technology-supported learning. Digital mind-mapping tools can help student teachers create, edit, share, and present their ideas easily. The use of such technology can make learning more interactive and visually engaging. It also supports the objectives of NEP 2020, which emphasizes the effective use of technology to improve educational access, equity, and quality.

16. LIMITATIONS OF THE STUDY

The study has the following limitations:

1. The study was limited to 100 teacher educators from selected teacher education institutions in the Kalaburagi region.
2. The study was restricted to recognized B.Ed. and M.Ed. teacher education institutions affiliated with Gulbarga University in the selected geographical area.



3. The study used the descriptive survey method, so it mainly describes the existing attitude and aptitude of teacher educators.
4. The study considered only two main variables, namely attitude and aptitude towards mind map-based strategies.
5. The demographic variables were limited to gender, teaching experience, and academic qualification.
6. The study used an Attitude Scale and an Aptitude Measure as the main tools for data collection. Therefore, the findings depend on the quality and responses of these tools.
7. The attitude scale depended on the self-reported responses of teacher educators, which may sometimes be influenced by personal opinions or social expectations.
8. The aptitude measure mainly assessed areas such as concept organization, logical relationships, visual thinking, creativity, sequencing, and construction of mind maps. Other abilities may not have been fully covered.
9. The findings of the study may not be generalized to all teacher educators in Karnataka or other regions, as the sample was limited to the selected institutions in the Kalaburagi region.

17. SUGGESTIONS FOR FURTHER RESEARCH

Future researchers may undertake the following studies:

1. Experimental studies may be conducted to determine the effectiveness of mind map-based strategies in B.Ed. and M.Ed. programmes.
2. Comparative studies may examine manual and digital mind mapping.
3. Studies may examine the effect of mind mapping on student teachers' academic achievement.
4. Research may investigate the relationship between mind mapping and creativity.
5. Studies may examine the effectiveness of mind mapping in different pedagogical subjects.
6. Digital mind-map-based modules may be developed for teacher education.
7. Comparative studies may be conducted across different states and regions.
8. Longitudinal studies may examine changes in teacher educators' attitude and aptitude after professional development.
9. Future research may investigate whether training programmes significantly improve practical mind-mapping competence.
10. Structural equation modelling or regression analysis may be used in larger samples to examine predictors of teacher educators' readiness to adopt mind map-based strategies.

18. CONCLUSION

Mind map-based strategies are useful in teacher education because they help teachers organize ideas visually, learn actively, think creatively, and understand concepts better. The present study examined the attitude and aptitude of 100 teacher educators towards mind map-based strategies. The results showed that gender, teaching experience, and academic qualification did not create any significant differences in their attitude or aptitude. However, a significant positive relationship was found between attitude and aptitude ($r = 0.274$, $p = 0.006$), which means that teacher educators with a more positive attitude towards mind mapping also tended to have better aptitude for using it.

The findings suggest that the use of mind mapping depends not only on teachers' personal or professional background but also on their interest, confidence, and practical ability to use this strategy. Therefore, teacher education institutions should provide professional development programmes that include both theoretical knowledge and practical training in mind mapping. Teacher educators should be given opportunities to prepare, practise, demonstrate, and evaluate mind map-based lessons. This can help promote more creative, reflective, learner-centred, and technology-supported teaching practices in teacher education.

19. RECOMMENDATIONS

Based on the findings, the following recommendations are made:

1. Teacher education institutions should organize regular workshops on mind map-based pedagogy.
2. Teacher educators should be encouraged to use mind maps in both face-to-face and digital teaching environments.
3. Practical activities should accompany theoretical training on mind mapping.
4. Peer demonstration and collaborative lesson planning should be encouraged.
5. Student teachers should be trained to construct and evaluate mind maps.
6. Digital mind-mapping applications may be incorporated into educational technology courses.
7. Faculty development programmes should assess both attitude and practical competence before and after training.
8. Institutions should provide adequate digital and instructional resources to facilitate innovative pedagogical practices.



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