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METACOGNITION OF HIGH SCHOOL MATHEMATICS TEACHERS IN THE SOUTHERN DISTRICTS OF TAMIL NADU

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Abstract:

This study intended to investigate the differences in metacognition of high school mathematics teachers with respect to sex, locale and type of management in the southern districts of Tamil Nadu. The sample consists of 303 high school mathematics teachers fromKanyakumari, Tirunelveli and Tuticorin districts, using random sampling technique. Percentage analysis reveals that majority of the mathematics teachers have moderate level of metacognition. Differential analyses reveal the following: (i) Male teachers are better than female teachers in their planning, memory, monitoring, evaluation dimensions and metacognition in total. (ii)Urban high school Mathematics teachers are found to be better than rural Mathematicsteachers in their memory and not in other dimensions. (iii) ANOVA reveals that government school teachers are better in their monitoring than aided and self- financed school teachers in their monitoring and not in other dimensions.

Introduction:

We are now in the threshold of a knowledge age. The nations which will rise and prosper will depend on the quality of education provided. Hence teachers play the pivotal role. So the means of shaping learning environments to develop their metacognition are required in order to enhance students reasoning and learning. The advances in understanding the basis for metacognition may encourage the development of new perspectives that may help us to motivate students to learn about their own learning processes.Hence, there is an urgent need to steer our efforts towards the implementation of metacognitive intervention strategies to enhance teaching competencies at all levels.

Significance of the Study:

Metacognition is an essential, but often neglected, component of a 21st century education that teaches students *how* to learn. From preschool through high school, the instructional schedule is packed with content lessons with little time for guiding students in developing the metacognitive and cognitive skills that can help them excel in the classroom and in the working world. Flavell (1987) proposed that good Schools should be 'hotbeds of metacognitive development' because of the opportunities they offer for self-conscious learning. Metacognition is most effective when it is adapted to reflect the specific learning contexts of a specific topic, course, or discipline (Zohar & David, 2009). Although the curriculum and professional development may cover instruction on cognitive strategies, the daily schedule may not provide the explicit teaching and intensive practice students need to learn how, when, where, and why to use these strategies effectively. As the lead learner in the classroom, teachers can make the concept of metacognition more concrete. From this we understand that effective academic learning requireshigh and sustained intellectual efficiency which requires high cognition.

Objectives of the Study:

- ✓ To find out the level of Metacognition of high school mathematics teachers in the Southern Districts of Tamil Nadu.
- ✓ To find out whether there is any significant difference in Metacognition of high school mathematics teachers in the Southern Districts of Tamil Nadu based on variables: (i) Sex, (ii) Locale, (iii) Type of management.

Hypotheses Formulated:

- ✓ There exists significant difference between male and female high school mathematics teachers in their metacognition and its dimensions.
- ✓ There exists significant difference between rural and urban high school mathematics teachers in their metacognition and its dimensions.
- ✓ There exists significant difference among government, aided and Self-financed high school mathematics teachers in their Metacognition and its dimensions.

Method of the Research:

Survey method of research was used for the present study. The investigator used the stratified random sampling technique to select a sample of 303 high school mathematics teachers from the schools in three southern districts of Tamil Nadu.

Tool Used: The investigator used a tool constructed and validated by Ushaparvathi and Rasul Mohaideen titled as "Tool to Assess Metacognition" (2009).

Statistical Technique Used:

The investigator used percentage analysis,t-test and ANOVA to analyse the data collected.

Analysis and Interpretation of Data:

Descriptive Analysis:

To find out the level of metacognition and its dimensions of high school mathematics teachers

Table 1: Level of Metacognition and its Dimensions of High School Mathematics Teachers

Metacognition and its Dimensions	Low		Moderate		High	
	N	%	N	%	N	%
1. Planning	33	10.9	213	70.3	57	18.8
2. Memory	21	6.9	253	83.5	29	9.6
3. Monitoring	72	23.8	205	67.7	26	8.6
4. Evaluation	30	9.9	212	70.0	61	20.1
5. Achievement	39	12.9	264	87.1	0	0.0
Metacognition in Total	33	10.9	243	80.2	27	8.9

- ✓ It is inferred from the above table that 10.9% of high school mathematics teachers have low, 70.3% of them have moderate and 18.8% of them have high level of Planning;
- ✓ 6.9%of high school Mathematics teachers have low, 83.5% of them have moderate and 9.6% of them have high level of Memory.
- ✓ 23.8% of high school Mathematics teachers have low, 67.7% of them have moderate and 8.6% of them have high level of Monitoring.
- ✓ 9.9% of high school Mathematics teachers have low, 70.0% of them have moderate and 20.1% of them have high level of Evaluation.
- ✓ 12.9% of high school Mathematics teachers have low, 87.1% of them have moderate and none of them have high level of Achievement.
- ✓ 10.9% of high school Mathematics teachers have low, 80.2% of them have moderate and 8.9% of them have high level of metacognition in total.

Hypothesis Testing:

Hypothesis 1:

There exists significant difference between male and female high school Mathematics teachers in their metacognition and its dimensions.

Table 2: Difference between Male and Female High School Teachers in their Metacognition and its Dimensions

Metacognition and its Dimensions	Gender	N	Mean	S.D.	Calculated 't' value	Remarks
1. Planning	Male	96	49.51	4.106	2.098	S
	Female	207	47.30	5.087		
2. Memory	Male	96	43.71	4.248	2.332	S
	Female	207	41.43	5.484		
3. Monitoring	Male	96	61.71	5.887	2.536	S
	Female	207	56.76	7.047		
4. Evaluation	Male	96	43.91	4.168	2.532	S
	Female	207	40.43	5.475		
5. Achievement	Male	96	39.80	3.463	0.653	NS
	Female	207	39.51	4.043		
Metacognition in Total	Male	96	197.83	14.704	2.399	S
	Female	207	185.00	19.349		

(At 5% level of significance, the table value of 't' is 1.96)

It is inferred from the above table that the calculated 't' value of planning, memory, monitoring, evaluation and metacognition in total (2.098, 2.332, 2.536, 2.532, 2.399) is greater than the table value (1.96) at 5% level of significance. Hence the hypothesis is accepted and there is significant difference between male and female high school mathematics teachers in their planning, memory, monitoring, evaluation and metacognition in total. While comparing the mean scores of male and female high school Mathematics teachers, Male (Mean=49.51, 43.71, 61.71, 43.91, 197.83) teachers are better than female (Mean = 47.30, 41.43, 56.76, 40.43, 185.00) teachers in their planning, memory, monitoring, evaluation and metacognition in total.

But the calculated 't' value of achievement (0.653) is less than the table value (1.96) and so the hypothesis is rejected and there is no significant difference between male and female high school mathematics teachers in their achievement. Hence the hypothesis with respect to achievement is rejected, and there is no significance of difference between male and female high school Mathematics teachers in their achievement.

Hypothesis 2:

There exists significant difference between rural and urban high school Mathematics teachers in their metacognition and its dimensions.

Table 3: Difference between Rural and Urban High School MathematicsTeachers in their Metacognition and its Dimensions

Metacognition and its Dimensions	Locality	N	Mean	S.D	Calculated 't' value	Remarks
1. Planning	Rural	197	8.11	0.592	1.273	NS
	Urban	106	8.01	0.655		
2. Memory	Rural	197	50.46	5.507	2.37	S
	Urban	106	58.56	7.425		
3. Monitoring	Rural	197	7.28	0.963	0.032	NS
	Urban	106	7.28	0.993		
4. Evaluation	Rural	197	8.70	0.978	0.060	NS
	Urban	106	8.71	0.976		
5. Achievement	Rural	197	9.37	0.947	0.568	NS
	Urban	106	9.43	0.916		
Metacognition in Total	Rural	197	42.16	2.350	0.076	NS
	Urban	106	42.18	2.413		

(At 5% level of significance, the table value of 't' is 1.96)

It is inferred from the above table that there is no significant difference between rural and urban high school mathematics teachers in their planning, monitoring, evaluation, achievement and metacognition, as the calculated 't' values is less than the table value thus the hypothesis is rejected.

But the calculated 't' value of find the memory, (2.37) is greater than the table value (1.96) and so the hypothesis accepted, Hence there is significant difference between rural and urban high school Mathematics teachers in their memory. While comparing the mean scores of rural and urban high school Mathematics teachers, urban (Mean=58.56) high school mathematics teachers are found to be better than rural (Mean = 50.46).

Hypothesis 3:

There exists significant difference among government, aided and Self-financed high school mathematics teachers in their Metacognition and its dimensions.

Table 4: Difference among Government, Aided and Self-financed High School Mathematics Teachers in Their Metacognition and its Dimensions

Metacognition and its Dimensions	Source of Variation	df (2, 300)		Calculated 'F' Value	Remarks
		Sum of Squares	Mean Square		
1. Planning	Between	0.807	.404	1.066	NS
	Within	113.595	.379		
2. Memory	Between	.723	.361	0.514	NS
	Within	210.868	.703		
3. Monitoring	Between	8.699	4.350	4.720	S
	Within	276.456	.922		
4. Evaluation	Between	3.486	1.743	1.843	NS
	Within	283.781	.946		
5. Achievement	Between	2.417	1.209	1.385	NS
	Within	261.847	.873		
Metacognition in Total	Between	2.944	1.472	0.261	NS
	Within	1690.805	5.636		

(At 5% level of significance, for (2,300) df, the table value of 'F' is 3.02)

It is inferred from the above table that there is no significant difference among government, aided and Self-financed high school mathematics teachers in their planning, memory, evaluation, achievement and metacognition as the calculated 'F' value is less than the table value thus the hypothesis rejected. But there is significant difference among government, aided and Self-financed high school Mathematics teachers in their monitoring as the calculated 'F' value is greater than the table value thus the hypothesis is accepted.

Table 4 (a): Post Anova (Waller Duncan) for Monitoring Dimension

Management	N	Subset for alpha = 0.05	
		Mean 1	Mean 2
Self-financed	87	7.05	
Aided	80		7.25
Government	136		7.45

While comparing the mean scores of Self-financed (Mean=7.05), Aided (Mean=7.25) and Government (Mean=7.45) high school Mathematics teachers, Government school teachers are better in their monitoring.

Findings:

- ✓ There is significant difference between male and female high school mathematics teachers in their logical planning, memory, monitoring, evaluation and metacognition in total. While comparing the mean scores, male teachers are better than female teachers in their planning, memory, monitoring, evaluation and metacognition in total. But there is no significance of difference between male and female high school Mathematics teachers in their achievement.
- ✓ There is no significant difference between rural and urban high school mathematics teachers in their planning, monitoring, evaluation, achievement and metacognition. But there is significant difference between rural and urban high school Mathematics teachers in their find the memory. While comparing the mean scores urban high school Mathematics teachers are found to be better than rural.
- ✓ There is no significant difference among government, aided and Self-financed high school mathematics teachers in their planning, memory, evaluation, achievement and metacognition. Government school teachers are better in their monitoring than Aided and self-financed school teachers.

Conclusion:

It is concluded from the study that there exists significant difference in metacognition with respect to sex and locality, but not with respect to type of management. Metacognitive strategies reflect a change in teacher's mind, knowledge and beliefs and about the way the mind operates. Metacognitive strategies also enable teachers to successfully cope with new situations. The superiority of metacognitive strategies areremarkable in the achievement of different objectives namely knowledge, understanding, application and skill.Effective metacognitive strategies equip the teachers in adopting various teaching methods. Hence it is clear that good teachers are highly metacognitive – they reflect on their expertise and teaching and refine their pedagogy accordingly.

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