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METACOGNITION IN SECONDARY SCHOOL PUPILS

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Abstract

This study seeks to find out the metacognition among secondary school pupils in Guntur district, Andhra Pradesh. The research encompasses a diverse range of secondary schools, including government and private institutions, as well as those offering instruction in Telugu and English mediums. Both rural and urban areas are included to ensure a comprehensive representation of the district's educational landscape. Employing a stratified random sampling technique, The investigator personally collected the data from the sample1000 students of IX class.For assessing Meta cognition level of the secondary school pupils, the 'Metacognition scale' developed and standardized by Prof.Dr.Mubarak Singh and MS. Ana Bali (2017) have been used. This test was published by Agra Psychological Research Cell. Employing a stratified random sampling technique and later on the collected data was subjected to statistical treatment,analysed and interpreted. Percentages, means scores, standard deviation, t-values, F-values and Pearson correlation were applied to the collected data. 74% of the total students found to have moderate to extremely high level of Metacognition. The "t" ratios w.r.t all the variables were found to be not significant. The "f" ratios w.r.t the variable parental Educational Background was found to be rejected but the "f" ratios w.r.t the variable parental Economic background was found to be accepted.

Keywords: Metacognition, Secondary School Pupils

Introduction:

Metacognition, the awareness and understanding of one's own cognitive processes.Metacognition refers to the ability to reflect upon and regulate one's own thinking processes. It involves being aware of one's own thoughts, knowledge, and strategies, and being able to monitor and control one's cognitive activities. Metacognitive skills play a crucial role in the learning process, and they are particularly important for secondary school pupils. Metacognition helps students become more effective learners. By understanding how they learn best, students can develop appropriate strategies for comprehending and retaining information. They can use metacognitive strategies such as setting goals, planning, monitoring their progress, and evaluating their understanding to improve their learning outcomes. Metacognition helps students become self-regulated learners by managing their time, setting priorities, and monitoring their progress. They can identify their strengths and weaknesses, seek help when needed, and make adjustments to improve their performance. Metacognition facilitates the transfer of learning from one context to another. Students who are aware of their cognitive processes can recognize similarities between different situations and apply their knowledge and skills effectively.Developing metacognitive skills can boost students' confidence and motivation. Metacognition also encourages a growth mindset, as students recognize that effort and effective strategies can lead to improvement, which in turn motivates them to take on new challenges.

Need and significance of the study:

Metacognition refers to the ability to think about and reflect on one's own thinking processes. It involves a range of cognitive skills and strategies that enable individuals to monitor, control, and regulate their own thinking and learning. Metacognition is thinking about thinking. It involves being aware of one's own thought processes and understanding how to use that awareness to improve one's learning and problem-solving abilities. Metacognition is an important aspect of learning and problem-solving, as it enables individuals to become more effective thinkers and learners. The investigator felt the need of finding the metacognition levels of secondary school pupils.

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Review of related studies:

Stewart Cooper and Moulding(2007), investigated how professional instructors improve their metacognition. Results showed that age and years of teaching experience both substantially increase metacognition.

MandaciSahin(2012) aimed to investigate the impact of using metacognitive strategies for problem-solving in geometry on fifth-grade students' achievement, metacognitive skills, and attitude.At the conclusion of the study, both groups were administered a posttest using the same data collection instruments as the pretest. The data were analyzed using dependent and independent t-tests.

Sahin and Kendir (2013) conducted a study to ascertain whether there was a significant difference in academic achievement between the experimental group, which was taught to solve mathematical problems using metacognitive strategies, and the control group, which was taught mathematics using conventional methods, The results indicated that, in comparison to conventional methods, metacognitive tactics increased the students' success at a greater level.

Linkage of the Present Study:

The present study is very much linked with the studies of **Wisdom Stewart Cooper and Moulding(2007), MandaciSahin(2012) Sahin and Kendir (2013)** who intended to investigate the awareness of metacognition of secondary school pupils with reference to gender and other demographic variables.

Statement of the Problem:

The present study is intended to find out the level of metacognition in secondary school pupils.

Research Questions:

1. What is the level of meta-cognition of the secondary school pupils?
2. What is the level in different areas of meta-cognition of the secondary school?
3. Is there any significant difference in the mean scores of the dimensions of meta-cognition of the secondary school pupils with respect to the variables –Gender, Locality...etc.?

Title of the Study:

"Metacognition in Secondary school pupils"

Operational Definitions of the Study:

Metacognition:

The persons' way of thinking and understanding of his / her way of thinking and his / her own ability to control one's own thought processes. It is the cognitive process of persons' higher order thinking that involves active control over the thinking processes which enables an individual how to approach a problem and solve in a very effective manner. It contains three dimensions-I. Knowledge of cognition, II. Regulation of cognition, III. Meta-cognitive experience

Secondary School Pupils:

The pupils studying from VI to X classes in the secondary schools are considered as the secondary school pupils. In the present study IX class pupils were considered.

Objectives of the study:

1. To find out the level of meta-cognition and its dimensions of the secondary school pupils and to classify them.
2. To find and compare the dimensions of Meta-cognition of the secondary school pupils with respect to the following variables
   a. Gender(Girls/Boys)
   b. Location of the school (Urban/Rural)
   c. Type of Institution(Govt./Private)
   d. Medium of Instruction(Telugu/English)
   e. Parental Educational Qualification (10^{th} class and below/Inter/Degree and above)
   f. Economic Background (Poor (below2 lakhs) /Middle class(2-12 lakhs)Rich (above 12lakhs)

Hypotheses of the study:

Ho1to4:There would be no significant difference between boys and girls, rural and urban, Government and private, English and Telugu medium of Secondary School Pupils in terms of the first dimension of Metacognition Level i.e. Knowledge of Cognition.

Ho 5&6: There would be no significant difference in terms of first dimension of Metacognition Level i.e. Knowledge of Cognition among Secondary School Pupils w.r.t variable Parental Educational Background and Economic Background,

Ho7 to10:There would be no significant difference between boys and girls, rural and urban, Government and private, English and Telugu medium of Secondary School Pupils in terms of the first dimension of Metacognition Level i.e. Regulation of Cognition

Ho 11 &12: There would be no significant difference in terms of second dimension of Metacognition Level i.e. Regulation of Cognition Secondary School Pupil. w.r.t the variable-Parental Educational Background and Economic Background

Ho 13 to 16: There would be no significant difference between boys and girls, rural and urban, Government and private, English and Telugu medium of Secondary School Pupils in terms of the first dimension of Metacognition Level i.e.Metacognitive Experiences.

Ho17&18: There would be no significant difference in terms of third dimension of Metacognition Level i.e. Metacognitive Experiences of Secondary School Pupils w.r.t the variable-Parental Educational Backgroundand Economic Background.

Variables of the study:

Independent Variables:

a. Gender(Girls/Boys),**b**. Location of the school (Urban/Rural)

c. Type of Institution(Govt./Private) **d.** Medium of Instruction(Telugu/English)

e. Parental Educational Qualification (/10th class and below /Inter/Degree and above)

f. Economic Background (Poor /Middleclass/Rich)

Dependent Variables:

Metacognition

Method of Investigation:

The present study intended to find out the metacognition of secondary school pupils. Normative survey method was used to carry out the present study.

Scope and delimitation of the Study:

- The scope of the present study is to find out the metacognition of secondary school pupils.
- The present study is limited to1000 secondary school pupils only.
- This study is also limited to collect data from IX class from secondary schools of Guntur district of Andhra Pradesh.

Sample and sampling Techniques:

A sample is a smaller representation of the large whole. For the present study the investigator has used stratified random sampling technique to select a sample of 1000 secondary school students (IX class) from the schools of Guntur district of Andhra Pradesh.

Tools used in the study:

Meta Cognition Scale (Prof. Dr.Mubarak Singh and MS. Ana Bali)

For assessing Meta cognition level of the secondary school pupils, the 'Metacognition scale' developed and standardized by Prof. Dr.Mubarak Singh and MS. Ana Bali (2017) have been used. This test was published by Agra Psychological Research Cell. It consists of 50 items. The test consists of three major dimensions i.e. Knowledge of cognition, Regulation of cognition and Metacognitive experience.

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Standardization of the Scale

The final draft of the Metacognition Scale with 50 items, out of which 47 are positively worded and 3 items negatively worded was administered on a representative sample of 200 students (100boys and 100 girls) randomly selected from Secondary and Senior Secondary Schools of Jammu City. The sample was in the age range of 14 to 17 years of age. The range of minimum to maximum possible score is 50 to 250.

Reliability of Metacognition Scale

The investigators have used test-retest method of seeking the reliability of the present test. The co-efficient of correlation between these two sets of scores was 0.81, which is significant at 0.01 level of significance..

Statistical Technique Used:

For analyzing the data collected, mean, standard deviation, t-values, F-values were calculated.

Objective wise analysis and interpretation of the data:

Objective 1.To find out the level of Metacognition of the secondary school pupils and to classify them.

Meta-cognition Levels of Secondary School Pupils

Table: 1

N	Range	Min. Value	Max. Value	Mean	S.D.	% of Mean
1000	175	50	225	147.80	21.15	65.6

Interpretation:

The above table revealed the overall Metacognitionlevels of Secondary School Pupils,itis 147.80 with a S.D. of 21.15 and percentage of mean is 65.6 which is average.

Classification levels of Metacognition of Secondary School Pupils

Table: 2

Levels of Metacognition	Extremely High	High	Average	Low	Extremely Low	Total
N	**123**	**211**	**406**	**185**	**75**	**1000**
Percentage	**12.3%**	**21.1%**	**40.6%**	**18.5%**	**7.5%**	**100%**

Variable wise significant difference in the level of Metacognition of Secondary School Pupils

Verification of Hypotheses 1to 4:

There would be no significant difference between boys and girls, rural and urban, Government and private, English and Telugu medium Secondary School Pupils in terms of the first dimension of Metacognition Level i.e. Knowledge of Cognition.

Table:03

Metacognition Level i.e. Knowledge of Cognition of the secondary school pupils w.r.t different variables-Gender, Locality, Management, Medium of Instruction.

Gender	Mean	S.D.	N	SE_D	t-value	df	Sig.
Boys	**81.75**	**19.11**	**500**	**1.19**	**0.95**	**998**	**0.34^{NS}**
Girls	**80.61**	**18.57**	**500**				
Locality	**Mean**	**S.D.**	**N**	**SE_D**	**t-value**		**Sig.**
Rural	**78.95**	**18.67**	**500**	**1.18**	**3.76**	**998**	**0.00****

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Urban	**83.40**	**18.76**	**500**				
Management	**Mean**	**S.D.**	**N**	**SE_D**	**t-value**		**Sig.**
Govt.	**80.78**	**18.73**	**500**	**1.19**	**0.67**	**998**	**0.51^{NS}**
Private	**81.58**	**18.96**	**500**				
Medium	**Mean**	**S.D.**	**N**	**SE_D**	**t-value**		**Sig.**
English	**78.32**	**18.76**	**500**	**1.17**	**4.32**	**998**	**0.00****
Telugu	**84.04**	**18.32**	**500**				

NS: Not Significant ** significant at 0.01 level

Interpretation

For finding the significance of difference t-values were found. The above table describes that the variables locality and medium of instruction are significantly influencing the first dimension of Metacognition Level i.e. Knowledge of Cognition, whereas the other variables-gender and management are not significant. It was also found that the urban and rural, Telugu and English medium secondary school students seem to possess higher level of the first dimension of Metacognition Level i.e. Knowledge of Cognition. Therefore, the Hypotheses 2&4 are rejected and 1&3 are accepted.

Verification of Hypothesis 5&6:

There would be no significant difference in terms of the first dimension of Metacognition level i.e Knowledge of Cognition among Secondary School Pupils w.r.t variable Parental Educational Back ground and Economical Background.

Table: 04

Metacognition Level i.e. Knowledge of Cognition of the secondary school pupils w.r.t the variable Parental Education background and Economical Background.

Parental Educational Background	**N**	**S.D.**	**Mean**	**Groups**	**Sum of Squares**	**Df**	**Mean Squares**	**F-value**	***significant***
Below 10th	120	13.53	75.34	Between Groups	14503.254	2	7251.627	39.445	S**
Inter	240	16.43	81.56	Within Grgoups	18390.032	997	183.842		
Above degree	640	12.32	72.45	Total	17793.268	999			
Parental Economic Background	**N**	**S.D.**	**Mean**	**Groups**	**Sum of Squares**	**Df**	**Mean Squares**	**F-value**	**significant**
Below 2lakhs	418	09.54	87.01	Between Groups	295.692	2	147.846	1.37	NS
2lakhs to 12 lakhs	484	10.84	86.28	Within Groups	106874.722	997	107.196		
Above 12 lakhs	98	11.20	88.03	Total	107170.414	999			

NS: Not Significant

Interpretation

The above table describes that the variable 'Parental Education is significantly influencing the first dimension of Metacognition Level i.e. Knowledge of Cognition and the variable Economic Background is not significant. Therefore, the Hypotheses 5 is rejected and 6 is accepted

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Verification of Hypothesis 7 to 10:

There would be no significant difference between boys and girls, rural and urban ,Government and private, English and Telugu medium of Secondary School Pupils in terms of the second dimension of Metacognition Level i.e. Regulation of Cognition

Metacognition Level i.e. Regulation of Cognition of the secondary school pupils w.r.t the variable Gender, Locality, Management, Medium of instruction

Table:05

Gender	Mean	S.D.	N	SE_D	t-value	df	Sig.
Boys	52.26	12.56	500	0.78	0.45	998	0.00^{NS}
Girls	52.62	12.25	500				
Locality	**Mean**	**S.D.**	**N**	SE_D	**t-value**	**df**	**Sig.**
Rural	50.32	12.24	500	0.78	5.43	998	0.00**
Urban	54.56	12.49	500				
Management	**Mean**	**S.D.**	**N**	SE_D	**t-value**	**df**	**Sig.**
Govt.	51.32	12.21	500	0.74	3.03	998	0.00**
Private	53.56	12.32	500				
Medium	**Mean**	**S.D.**	**N**	SE_D	**t-value**	**df**	**Sig.**
English	51.95	12.32	500	0.78	1.25	998	NS
Telugu	52.93	12.47	500				

NS: Not Significant **** significant at 0.01 level**

Interpretation:

The above table describes that the variables locality and management are significantly influencing thesecond dimension of Metacognition Level i.e. Regulation of Cognition, where as the other variables-gender and medium of instruction are not significant. It was also found that the urban and private secondary school students seem to possess higher level of .the second dimension of Metacognition Level i.e.Regulation of Cognition.Therefore the Hypotheses 8&9 are rejected and 7&10 are accepted

Verification of Hypothesis 11&12:

There would be no significant difference in terms of the second dimension of Metacognition level i.e Regulation of Cognition among Secondary School Pupils w.r.t variable Parental Educational Back ground and Economical Background.

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Table: 06
Metacognition Level i.e. Regulation of Cognition of the secondary school pupils w.r.t the variable Parental Education background and Economical Background.

Parental Educational Background	**N**	**S.D.**	**Mean**	**Groups**	**Sum of Squares**	**Df**	**Mean Squares**	**F-value**	***significant***
Below 10th	120	12.45	47.43	Between Groups	5091.336	2	2545.668	21.70	S
Inter	240	11.43	52.56	Within Groups	116935.425	997	117.287		
Above degree	640	10.23	54.45	Total	122026.761	999			
Parental Economic Background	**N**	**S.D.**	**Mean**	**Groups**	**Sum of Squares**	**Df**	**Mean Squares**	**F-value**	**significant**
Below 2lakhs	418	11.20	53.53	Between Groups	5262.429	2	2631.214	19.15	S
2lakhs to 12 lakhs	484	12.40	56.94	Within Groups	136925.323	997	137.337		
Above 12 lakhs	98	10.33	49.88	Total	142187.752	999			

NS: Not Significant at any Level

Interpretation
The above table describes that the variable 'Parental Education' and 'Economic Background' are significantly influencing the second dimension of Metacognition Level i.e.Regulation of Cognition. Therefore the Hypotheses 11&12 are rejected.

Verification of Hypothesis 13 to 16:
There would be no significant difference between Boys and Girls of Secondary School Pupils in terms of third dimension of Metacognition Level i.e. Metacognitive Experiences.

Table.07
Metacognition Level i.e. Metacognitive Experience of the secondary school pupils w.r.t the variable Gender, Locality, Management

Gender	**Mean**	**S.D.**	**N**	**SE_D**	**t-value**	**df**	**Sig.**
Boys	**29.01**	**9.08**	**500**	**0.57**	**7.29**	**998**	**0.00****
Girls	**33.17**	**9.10**	**500**				
Locality	**Mean**	**S.D.**	**N**	**SE_D**	**t-value**	**df**	**Sig.**
Rural	**33.02**	**9.08**	**500**	**0.57**	**6.77**	**998**	**0.00****
Urban	**29.16**	**9.09**	**500**				
Management	**Mean**	**S.D.**	**N**	**SE_D**	**t-value**	**df**	**Sig.**
Govt.	**32.67**	**9.11**	**500**	**0.58**	**5.44**	**998**	**0.00****

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Private	**29.51**	**9.07**	**500**				
Medium	**Mean**	**S.D.**	**N**	**SE_D**	**t-value**	**df**	**Sig.**
English	**29.98**	**9.09**	**500**	**0.54**	**4.11**	**998**	**0.00****
Telugu	**32.20**	**8.99**	**500**				

NS: Not Significant ** significant at 0.01 level

Interpretation:
For finding the significance of difference t-values were found. The above table describes that the variables Gender, locality, management and medium are not significant the third dimension of Metacognition Level i.e. Metacognitive experience,. Therefore the Hypotheses 13 to 16 are rejected .

Verification of Hypothesis 17&18:
There would be no significant difference in terms of the third dimension of Metacognition level i.e Metacognitive Experiences among Secondary School Pupils w.r.t variable Parental Educational Back ground and Economical Background.

Table: 08
Metacognition Level i.e.Metacognitive Experiences of the secondary school pupils w.r.t the variable Parental Education background and Economical Background.

Parental Educational Background	**N**	**S.D.**	**Mean**	**Groups**	**Sum of Squares**	**Df**	**Mean Squares**	**F-value**	***significant***
Below 10th	120	10.04	32.45	Between Groups	605.003	2	302.501	3.67	NS
Inter	240	9.07	29.76	Within Groups	82158.213	997	82.405		
Above degree	640	8.89	30.32	Total	82763.21	999			
Parental Economic Background	**N**	**S.D.**	**Mean**	**Groups**	**Sum of Squares**	**Df**	**Mean Squares**	**F-value**	**significant**
Below 2lakhs	86.53	10.20	418	Between Groups	789.858	2	394.929	0.72	.40
2lakhs to 12 lakhs	85.94	10.40	484	Within Groups	454225.497	827	549.245		
Above 12 lakhs	85.88	10.33	98	Total	455015.355	829			

NS: Not Significant at any Level
Interpretation:
The above table describes that the variable 'Parental Education is not significant the third dimension of Metacognition Level i.e. metacognitive experience and the variable Economic Background is significantly influencing the third dimension of Metacognition Level i.e. metacognitive experience .Therefore the Hypotheses 17 is accepted and 18 is rejected.

Education implications:

1.The present study may be helpful to the policy makers decision making personnel, curriculum developers, administrators ,educationists, teacher ,parents and so on in finding the metacognition levels of secondary school pupils.

2. The present research may also helpful to the educationalists to estimate the level of metacognition. If metacognition is correctly addressed the pupils can have a correct method of thinking which results in accomplishment in their studies.

3. Findings of the study may also helpful to adopt differentiated instructional approaches and to accommodate varying levels of metacognitive awareness among secondary school pupils.

The present research may also be helpful educationists, curriculum makers to promote metacognitive development across the student population and to incorporating a range of learning strategies and providing personalized support.

4.Educators can employ techniques such as think-alouds, reflective journals, self-questioning prompts, and goal-setting exercises to assist students in understanding and applying metacognitive strategies.

Suggestions for further study:

1. Study on the impact of teaching metacognitive strategies on academic performance across different subjects and age groups may be taken up.

2. Study to identify effective interventions that promote metacognitive skills in secondary school students and assess their impact on self-regulation, problem-solving, and learning outcomes could be done.

3. A study may be taken up to investigate how metacognitive awareness influences students' motivation, engagement, and factors like self-efficacy, interest, and perseverance.

4. Another study to evaluate the effectiveness of metacognitive instruction in diverse educational settings, considering inclusive classrooms and students with different learning styles, abilities, and cultural backgrounds. Adapt metacognitive strategies to meet their specific needs may be done.

Conclusion

The study examined the level of metacognition among secondary school pupils,its dimensions and the influence of variables on them. The results of this study revealedthat **74%** of the total students have moderate to extremely high level of metacognition. For the first dimension of metaognition-i.e knowledge of cognition the't' ratios w.r.t variables Gender,parental economic back ground and management were found significan. and Locality,parental education and medium of instruction were found not significant.. For the second dimension of metaognition-i.e Regulation of cognition the variables-Gender and medium of instruction were found significant. But the variables Locality parental education, parental economic back ground and management were found not significant. For the third dimension of metaognition-i.e metacognitive experience the variables Gender,Locality, management andmedium of instruction were found singinficant and parental education, parental economic back ground were found not significant. Therefore, it could be concluded that metacognitive strategies plays a prominent role among the secondary school pupils in the thinking knowing and understanding the concepts.

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