

Metacognition and Academic Performance of Rural Adolescents

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ABSTRACT The present study was undertaken to study the impact of metacognition on academic performance of rural adolescents (13-16 years). The study was carried out in rural schools of block-I, Ludhiana District. The sample comprised of 240 rural adolescents equally distributed over four grades (7th, 8th, 9th and 10th grade), two sexes and two socio-economic groups i.e. middle and low socio-economic group. Metacognitive skills of the subjects were assessed using a self-structured Questionnaire adapted from Metacognition Inventory and Metacognitive Awareness Inventory. To assess the academic performance of the subjects, the aggregate percentage of marks obtained by them in the last school examination was procured from the concerned teachers. Results revealed that the major proportion of subjects with high level of metacognition also performed above average in academics. Further, analysis depicted that both the components of metacognition viz. 'Knowledge of Cognition' and 'Regulation of Cognition' significantly contributed towards the academic performance of the adolescents.

INTRODUCTION

Metacognitive abilities help in estimating one's knowledge related to academic achievement in adolescent years. While young students learn a great deal of new knowledge and over time, successful students learn to update their knowledge as new concepts, facts, and procedures are acquired (Everson and Tobias 1998). Also, Gougey (1998) described self-regulatory processes that promote achievement in the basic skills of reading and mathematical problem solving. Metacognition has been described as integrated with reading and mathematics instruction and students' reactions to learning to think metacognitively.

Metacognition is important in learning and is a stronger predictor of academic success (Dunning et al. 2003; Kruger and Dunning 1999). Students with good metacognition demonstrate good academic performance compared to students with poor metacognition. Students with poor metacognition may benefit from metacognitive training to improve their metacognition and academic performance. Individual differences exist in metacognition and people with poor metacog-

nitition are deemed "incompetent" as they perform inadequately relative to their peers (Kruger and Dunning 1999).

Metacognition enables students to be strategic in their learning by, for instance, learning new information rather than focusing on studying information already learned (Everson and Tobias 1998). While a positive relationship between a mastery goals and metacognition has been widely established, the relationship between metacognition and performance goals is less clear. Some studies cite a weak positive relationship between metacognition and performance goals (for example, Ames and Archer 1998) whereas other studies report a negative relationship (Wotlers 1998) or no relationship (Ford et al. 1998)

Many researchers believe that metacognition holds great deal of promise for helping students do better. Metacognition has been linked to a wide variety of positive academic outcomes for students such as better grades and performance on tests of intelligence.

Kirsh (1999) illustrates this point by stating that all of us look at the clock to see how quickly we are making progress. All of us look ahead to see how many pages are left in our text, or whether there is an example of how to do the assignment we are stuck on." If used efficiently and frequently, these physical resources have the potential to help a novice learner become more expert in their own right.

Annevirta and Vauras (2006) examined the development of metacognitive skill in elemen-

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tary school children. The results divulged that children with initially high metacognitive level had better metacognitive skill in problem-solving tasks during first two school years, whereas the self-guided behaviour of children with lower metacognitive knowledge resembled more the type of adult-dependent behaviour typical of young children as late as the second grade. So, there was no clear developmental relationship between metacognitive knowledge and metacognitive skills.

As students of all ages and learning competencies become more skilled at using a metacognitive approach to their own learning, they gain confidence and tend to become more independent as learners. This newfound independence leads to the ultimate goal of metacognition: ownership. Once students have come to the realization that they can pursue their own intellectual needs, they will discover a world of information at their fingertips and the tools needed to fully take advantage of resources. As previously mentioned, the important job of an educator is to acknowledge any problem areas, and model the metacognitive process. An educator must then cultivate and exploit the abilities of each learner in the classroom, helping students individually reach their full potential. Lastly, an effective educator must enhance the metacognitive capabilities of all learners.

Past researches have revealed a close relationship between metacognition and performance. It is reasonable to suppose that optimizing the use of metacognitive behaviour can be addressed in terms of: 1) the appropriate use of a relevant metacognitive function, 2) the optimal frequency of metacognitive actions relevant cognitive actions, and 3) the optimal sequencing of metacognitive actions and functions (Wilson and Clark 2002)

There is no doubt that students are using metacognition, but regardless of how many metacognitive acts are used, success is not guaranteed. Metacognition becomes essential when tasks are more challenging.

Maqsd (1997) investigated the effects of metacognitive skills and nonverbal ability on academic achievement of high school pupils. Maqsd found that metacognitive ability tends to associate positively with academic attainment of high school pupils.

Everson et al. (1997) examined the correlation among measures of metacognitive knowl-

edge, learning and study strategies, and academic achievement across the domains of verbal ability and mathematics. They found that metacognitive knowledge was generalizable across both the verbal and mathematical domains. A positive correlation was also found between the two knowledge-monitoring measures and students' confidence estimates. Similarly, Everson and Tobias (1998) also found that knowledge monitoring had a significant relationship with school grades, continue to indicate that accurate monitoring is an important variable in school learning.

In sum, it may be concluded that there is a positive correlation between metacognition and academic success. Metacognition is awareness and understanding of how one thinks and uses strategies during teaching/learning process. However, personally motivated people tend to be more metacognitively aware as indicated in research literature.

Objectives

1. To examine the association between metacognition and academic performance of rural adolescents.
2. To analyse the impact of different components of metacognition on academic performance of rural adolescents.

METHODOLOGY

Locale of the Study

The study was conducted in Ludhiana City of Punjab state.

Selection of Sample

The sample for the present study comprised of randomly selected 240 rural adolescents studying in grade 7th, 8th, 9th and 10th from Ludhiana District.

Research Instruments

The following standardized tools were used to collect the relevant data for the study.

1. *Personal Information Sheet*: It was used to assess the socio-personal profile of the adolescents, viz. age, gender, family type, family size, number of siblings, birth order,

- education and occupation of the parents and monthly income of the family.
2. *Socio-Economic Status Scale developed by Meenakshi (2010)*: It was used to identify the adolescents from different socio-economic status families (low and middle). This scale consists of six different aspects, viz. education, profession, monthly income, resources, surrounding and social involvement.
 3. *Self-Structured Metacognitive Questionnaire*: The Self-Structured Metacognitive Questionnaire consisted of 67 statements out of which 23 statements were drawn from Metacognition Inventory (Govil 2003) and 44 from Metacognitive Awareness Inventory (Schraw and Dennison 1994). Thus, the Self-Structured Metacognitive Questionnaire provided a wide spectrum in-depth probe into the level of metacognitive skillfulness of the rural adolescents.

RESULTS AND DISCUSSION

The results of the study in line with the objectives envisaged in study are presented as follows:

- I. Socio-personal Characteristics of the Respondents
- II. Association of Metacognition with Academic Performance of Rural Adolescents
- III. Impact Analysis of Different Components of Metacognition on Academic Performance of Rural Adolescents

I. Socio-personal Characteristics of the Respondents

As the socio-Personal characteristics are an important determinant of an individual’s skillfulness and strategy formation. Therefore, it was important to understand the socio-personal characteristics of the subjects selected. The data pertaining to demographic profile of the rural adolescents from different socio- economic strata has been presented as per age, gender, birth order, number of siblings, education and occupation of parents, type and size of family (Table 1). The information about socio- personal characteristics of the respondents presented in the Table 1. Table 1 has been discussed under the following heads:

Age: The selected adolescents were in the age group of 13-16 years. Overall picture revealed that almost an equal number of respondents be-

longed to 13 years and 16 years of age (32.5% and 31.7%, respectively). However, 32.5 per cent of male respondents belonged to 13 years of age, 13.3 per cent to 14 years of age, 22.5 per cent to 15 years and rest 31.7 per cent belonged to 16 years of age. Similarly, in case of female respondents 36.7 per cent belonged to 13 years of age, 15 per cent to 14 years of age, 15.8 per cent to 15 years and rest 32.5 per cent belonged to 16 years of age.

Number of Siblings: Few subjects (2.92%) had no siblings whereas 22.50 per cent had one sibling, 35 per cent had two siblings and rest 39.58% had three or more than three siblings.

Table 1: Socio-personal characteristics of the respondents

Socio-personal characteristics	Male (n=120) f	Female (n=120) f	Overall (N=240) f
Age (years)			
13	39 (32.50)	38 (36.67)	77 (32.08)
14	16(13.33)	20(15.00)	36(15.00)
15	27(22.50)	24(15.83)	51(21.25)
16	38(31.67)	38(32.50)	76(31.67)
No. Siblings			
Only child	4(3.33)	3(2.50)	7(2.92)
One	36(30.00)	18(15.00)	54(22.50)
Two	44(36.67)	40(33.33)	84(35.00)
More than two	36(30.00)	59(49.17)	95(39.58)
Maternal Education			
Illiterate	27(22.50)	28(23.33)	55(22.92)
up to 5 th	48(40.00)	43(35.83)	91(37.92)
6 th to 10 th	42(35.00)	41(34.17)	83(34.58)
10 th to +2	2(1.67)	5(4.17)	7(2.92)
Graduate	1(0.83)	3(2.50)	4(1.67)
Postgraduate	0	0	0
Paternal Education			
Illiterate	15(12.50)	27(22.50)	42(17.50)
up to 5 th	34(28.33)	31(25.83)	65(27.08)
6 th to 10 th	66(55.00)	53(44.17)	119(49.58)
10 th to +2	3(2.50)	6(5.00)	9(3.75)
Graduate	2(1.67)	3(2.50)	5(2.08)
Postgraduate	0	0	0
Maternal Occupation			
House wife	92(76.67)	83(69.16)	175(72.92)
Business	5(4.17)	10(8.33)	15(6.25)
Service	16(13.33)	16(13.33)	32(13.33)
Farming	1(0.83)	1(0.83)	2(0.83)
Labourer	6(5.00)	10(8.33)	16(6.67)
Paternal Occupation			
Non-Working	2 (1.67)	0	2 (0.83)
Business	22(18.33)	21(17.50)	43(17.92)
Service	26(21.67)	22(18.33)	48(20.00)
Farming	17(14.17)	14(11.67)	31(12.92)
Labourer	53(44.17)	63(52.50)	106(48.33)
Family Type			
Nuclear	70(58.33)	76(63.33)	146(60.83)
Joint	50(41.67)	44(36.67)	94(39.17)

Figures in parentheses indicate percentages

Maternal Education: Regarding the educational level of mothers, major proportion of the respondents' mothers was either under matric or matric (37.92% and 34.58%, respectively). However, 22.92 per cent were illiterate. Only 1.67 per cent was graduates and none was postgraduate.

Whereas, in case of male respondents, 40 per cent were educated up to 5th grade, followed by 35 per cent matriculate, 22.50 per cent illiterate, 1.67 per cent was holding senior secondary or a diploma certificate and only 0.83 per cent mothers of rural boys were graduates. However, none of the mother was postgraduate.

A similar trend was noted for the mothers of female respondents with majority (35.8%) educated up to 5th grade, followed by 34.17 per cent up to matric, 23.33 per cent illiterate, 4.17 per cent up to +2 and rest 2.50 per cent graduate. None of the mother was postgraduate.

Paternal Education

A similar trend as in case of mothers was observed for the fathers of male as well as female subjects with majority of fathers' educated up to matric (49.58%) followed by 27.08 per cent up to 5th, 17.50 per cent illiterate, 3.75 per cent up to +2, 2.08 per cent graduate and none as post graduate.

However, it was noted that major proportion (55%) fathers of male respondents were matriculates, followed by 28.3 per cent up to 5th standard, 12.5 per cent were illiterate, 2.5 per cent were +2 or diploma and only 1.67 per cent were graduate. None of the father was postgraduate.

Whereas, 44.17 per cent fathers of female respondents were matriculate, followed by 25.8 per cent were educated up to 5th standard, 22.5 per cent were illiterate, 5 per cent were +2 or diploma and only 2.5 per cent fathers had a graduate degree. None of the father was postgraduate.

Maternal Occupation: Regarding occupation of mother, it was interesting to note that majority (72.92%) of the mothers irrespective of male and female respondents were housewives and the percentage was slightly higher in case of mothers of male respondents (76.67%) as compared to the mothers of female respondents (69.16%).

Only 13.3 per cent mothers of male respondents were in service and this percentage was comparable in case of mothers of female respon-

dents (13.3%). However, 4.2 per cent mothers of male respondents were in business and 8.3 per cent of female respondents. 5 per cent of mothers were labourer in case of boys where as in case of female, 8.3 per cent of mothers were labourer and only 0.83 per cent of mothers were in farming.

Paternal Occupation

Major proportion (44.17%) of fathers of the adolescent males were labourer, where as 21.67% were engaged in private or Government service, followed by business (18.33%), some of them (14.17%) were involved in farming, 1.67 per cent were non-working.

Similar trend was observed for the fathers of female respondents. Majority (52.50%) of them were labourer, 18.33 per cent were in service, 17.5 per cent in business, and 11.67 per cent in farming.

Family Type: The data reveals that major proportion (60.83%) of rural adolescents belonged to nuclear families and rest (39.17%) belonged to joint families. However, 58.33 per cent of male respondents belonged to nuclear families and rest 41.67 per cent were from joint families.

Whereas 63.33% of female respondents belonged to nuclear family and rest 36.67% were from joint families. Thus, major proportions of the respondents were either 13 or 16 years old and rest was 14 or 15 years old. Major proportion of the respondents had two or more than two siblings. In case of education of parents, major proportion of mothers and fathers were educated up to matric level and none was post graduate and few were graduate. Most of the mothers were housewife and fathers were engaged in farming. The next most preferred occupation was daily labourer. Majority of respondents had nuclear family.

II. Association of Metacognition with Academic Performance of Rural Adolescents

Tables 2 and 3 present the association between metacognition and academic performance of rural adolescents as envisaged under objective I.

The association of metacognition with academic performance was explored gender wise for in depth understanding of the relationship

The association of metacognition with academic performance of rural adolescents was explored through chi-square analysis and the results are presented in Table 2. The results revealed that metacognition was significantly associated with academic achievement ($\chi^2 (4) = 15.06^*$; $p < 0.05$). In case of rural girls, very few respondents (6.67%) were having low metacognition but good academic achievement; whereas almost 27.50 per cent of respondents had high metacognition along with good academic performance.

Table 2: Association of academic achievement with level of metacognition in rural girls (n=120)

Academic achievement (per cent)	Levels of metacognition		
	High (>3.46)	Average (3.46-3.10)	Low (<3.10)
Above average (>71 per cent)	33(27.50)	8(6.67)	8(6.67)
Average (70-61 per cent)	11(9.17)	12(10.00)	18(15.00)
Below average (<60 per cent)	15(12.50)	6(5.00)	9(7.50)

$\chi^2 = 15.06$, significant at 0.05, d.f. =4
 Figures in parentheses indicate percentages

Chisholm (1999) while investigating the effects of metacognition, critical thinking, gender and gender role identification on academic achievement found that female students had slightly higher achievement levels in overall grade point averages. Further, a significant correlation was found between metacognitive and critical thinking skills with students' grades. It was also indicated that when the effects of other factors were controlled, only critical thinking came out as a significant predictor of achievement. Similarly, Coutinho (2006) concluded that students with good metacognition tend to be successful students, while students with poor metacognition tend to perform poorly.

Table 3 elucidates the association between academic achievement and level of metacognition in rural boys. The metacognition in case of adolescent boys was also found to be significantly associated with academic achievement since the calculated chi-square value was found to be highly significant ($\chi^2 (4) = 43.95^*$; $p < 0.05$). Only one respondent (0.80%) was having low metacognition and good academic achievement; however more than twenty per cent (23.30%) of respondents were having poor metacognition and poor academic performance. Many studies as

well as the present study have shown that the use of cognition and meta-cognition leads to the students' success. Kummin and Rahman (2010) also recommend 'By providing the students with specific strategies such as cognitive and meta-cognitive in their learning activities, it will encourage them to learn effectively.'

Table 3: Association of academic achievement with level of metacognition in rural boys (n=120)

Academic achievement (per cent)	Levels of metacognition			χ^2
	High (>3.46)	Average (3.46-3.10)	Low (<3.10)	
Above average (>71 per cent)	15(12.50)	6(5.00)	1(0.80)	43.95*
Average (70-61 per cent)	9(7.50)	25(20.80)	14(11.70)	
Below average (<60 per cent)	2(1.70)	20(16.70)	28(23.30)	

$\chi^2 = 43.95$, significant at 0.05, d.f. =4
 Figures in parentheses indicate percentages

To sum up, the results have shown that cognitive and meta-cognitive approaches are effective in the improvement of the students' performance. The results show that the teacher's methods and his approach in the class, improve their students' self-esteem, self-conception, and their sense of security effectively. However, as recommended by Carrell et al. (1989) and later by Shokrpour et al. (2006), skilled readers do not use strategies meta-cognitively overnight; they learn such processes by doing it over long periods and this requires planning by teachers. Of course, some researchers believe that "meta-cognition should not be regarded as a final objective for learning or instruction. Rather, it provides an opportunity to provide students with knowledge and confidence, enabling them to manage their own learning and empowering them to be inquisitive and zealous in their pursuits. (Paris and Winograd 1990)

III. Impact Analysis of Different Components of Metacognition on Academic Performance of Rural Adolescents

To analyse the impact of different components of metacognition on the academic skillfulness of the rural adolescents the data is presented in Table 4 through Table 9.

Further, to develop an insight into the strengths and weaknesses of the learners with respect to

their metacognitive skills it was imperative to investigate the two components of the metacognition namely 'Knowledge of Cognition' and 'Regulation of Cognition' aspects.

'Knowledge of Cognition' component includes declarative knowledge, procedural knowledge, and conditional knowledge. 'Declarative knowledge' means knowledge about oneself as a learner and factors affecting cognition, 'Procedural knowledge' means awareness and management of cognition, including knowledge about strategies and 'Conditional knowledge' means knowledge about why and when to use a given strategy.

'Regulation of Cognition' component includes planning, comprehension monitoring, information management strategies, debugging strategies and evaluation. 'Planning' refers to goal setting and allocating resources prior to learning. 'Comprehension monitoring' means assessment of one's learning or strategy used. 'Information management strategies' means skills and strategy sequences used to process information more efficiently (for example, organizing, elaborating, summarizing, selective focusing). 'Comprehension monitoring' means strategies used to correct comprehension and performance errors. 'Evaluation' means analysis of performance and strategy effectiveness after a learning episode.

Therefore, Table 4 depicts the distribution of rural adolescents across various levels of metacognition with respect to the two components of metacognition namely 'Knowledge of Cognition' and 'Regulation of Cognition'. The data reflects that 38.33 per cent of respondents had high level of knowledge of their cognitive processes. This means that the respondents knew about themselves as learners, the strategies as well as the

conditions under which strategies were most useful. Whereas, 31.25 per cent respondents had low level of knowledge of cognition which indicates that they were not aware about their strengths and weaknesses as learner.

More number (46.67%) of girl respondents had high 'Knowledge of Cognition' as compared to the boys (30%). However, boys were found to be more in average (36.67%) and low level (33.33%) of this component of metacognition as compared to girls. These differences were found to be statistically significant (Z -value=2.65* and 2.10*; $p<0.05$) for the high and average category.

Distribution of rural adolescents at various levels of second component of metacognition that is, 'Regulation of Cognition' represented that 38.75 per cent of respondents had high knowledge regarding regulating their cognitive skills. This means that respondents easily made plans, implemented strategies, monitored, corrected comprehension errors and evaluated their learning. Whereas, 29.58 per cent of respondents had low level of 'Regulation of cognition' skills and 31.67 per cent had average skills. However, a major proportion of girls (54.17%) were found to possess higher skills in 'Regulation of Cognition' and major proportion of boys were found to be average (40%) or low (36.67%) in the regulation of cognitive processes. These findings were found to be statistically significant. (Z -value= 4.90*, 2.77* and 2.40*; $p<0.05$)

Table 5 presents the mean score distribution of rural adolescents across the two components of metacognition, namely 'Knowledge of Cognition' and 'Regulation of Cognition'. Table displays that girls had higher mean scores for the component of 'Knowledge of Cognition' at all levels as compared to the boys. The differences

Table 4: Per cent distribution of subjects with respect to the two components of metacognition across various levels of metacognition

Components of metacognition	Distribution of adolescents		Z-value	Overall (N=240)
	Boys (n=120)	Girls (n=120)		
<i>I. Knowledge of Cognition(mean score)</i>				
High (>3.46)	36(30.00)	56(46.67)	2.65*	92(38.33)
Average (3.10-3.46)	44(36.67)	29(23.33)	2.10*	73(30.42)
Low (<3.10)	40(33.33)	35(29.17)	0.69	75(31.25)
<i>II. Regulation of Cognition(mean score)</i>				
High (>3.46)	28(23.33)	65(54.17)	4.90*	93(38.75)
Average(3.10-3.46)	48(40.00)	28(23.33)	2.77*	76(31.67)
Low (<3.10)	44(36.67)	27(22.50)	2.40*	71(29.58)

*significant at 0.05

Figures in parentheses indicate percentages

Table 5: Mean scores (± S.D) of the rural adolescents with respect to the two components of metacognition across various levels of metacognition (N=240)

Components of metacognition	Distribution of adolescents		t-value	Overall Mean ± S.D
	Boys (n=120) Mean ± S.D	Girls(n=120) Mean ± S.D		
<i>I. Knowledge of Cognition (mean score)</i>				
High (>3.46)	3.60±0.11	3.65±0.13	3.22*	3.63±0.13
Average (3.10-3.46)	3.27±0.10	3.30±0.10	0.73	3.28±0.10
Low (<3.10)	2.75±0.25	2.88±0.14	4.98*	2.81±0.22
<i>II. Regulation of Cognition (mean score)</i>				
High (>3.46)	3.63±0.14	3.68±0.14	2.76*	3.66±0.14
Average (3.10-3.46)	3.26±0.10	3.27±0.10	0.24	3.26±0.10
Low (<3.10)	2.81±0.22	2.86±0.15	2.05*	2.83±0.19

*significant at 0.05

were found to be statistically significant (t-value= 3.22* and 4.98*; p<0.05) for the high as well as low category of the ‘Knowledge of Cognition’ component. This implies that they had better knowledge and control over their own thinking and learning activities, were better aware and had good management of cognition, including knowledge about appropriate strategies as compared to their male counterparts.

‘Regulation of cognition’ includes ‘planning’ means identification and selection of appropriate strategies and allocation of resources, ‘monitoring’ means attending to and being aware of comprehension and task performance and ‘evaluating’ means assessing the processes and products of one’s learning, and revisiting and revising learning goals.

In case of ‘Regulation of Cognition’, the girls showed better mean scores than boys indicating that girls could better plan, monitor, regulate and evaluate their learning strategies. These differences were found to be statistically significant (t-value=2.76* and 2.05*; p<0.05) for high as well as low category ‘Regulation of Cognition’.

The analyses of the two components of metacognition provides directions for identifying the specific areas requiring strengthening to enhance the metacognitive abilities of the learners which works as a catalyst to improve their academic scores as well.

To study the interdependence and relationship of the two components of metacognition the association between two components was also studied. The data in Table 6 depicts that the ‘Knowledge of Cognition’ component was highly associated with ‘Regulation of Cognition’ component ($\chi^2(4) = 164.022^*$; p<0.05). A large percentage (30.83%) of rural adolescents had both high

‘Cognitive Knowledge’ and ‘Cognitive Regulation’.

Table 6: Association between ‘Knowledge of Cognition’ and ‘Regulation of Cognition’ among rural adolescents (N=240)

I. Knowledge of cognition (mean score)	II. Regulation of cognition (mean score)		
	High (>3.46)	Average (3.46-3.10)	Low (<3.10)
High(>3.46)	74(30.83)	15(6.25)	3(1.25)
Average(3.46-3.10)	17(7.08)	42(17.50)	14(5.83)
Low(<3.10)	2(0.83)	19(7.92)	54(22.50)

$\chi^2= 164.02$, significant at 0.05, d.f=4

Figures in parentheses indicate percentages

Further this association was also analyzed gender wise. Firstly, in case of male respondents Table 7 revealed that ‘Knowledge of cognition’ was significantly associated with ‘Regulation of cognition’ ($\chi^2(4) = 70.75^*$; p<0.05). Almost 26.67 per cent of respondents were having both, low level of ‘Knowledge of Cognition’ and ‘Regulation of Cognition’. Whereas, 17.50 per cent of respondents were having high level of ‘Cognitive Knowledge’ as well as high level of ‘Regulation of Cognition’.

Whereas in case of female respondents data presented in Table 8 brought to light that ‘Knowledge of Cognition’ was significantly associated with ‘Regulation of Cognition’. ($\chi^2(4) = 91.55^*$; p<0.05). A major proportion (44.17 %) of girls scored high in both the components of metacognition.

Also, an attempt was made to identify the components of metacognition impacting academic performance of adolescents by employing linear regression analysis. The variables in-

Table 7: Association between 'Knowledge of Cognition' and 'Regulation of Cognition' in adolescent boys (n=120)

I. Knowledge of cognition (mean score)	II. Regulation of cognition (mean score)		
	High (>3.46)	Average (3.46-3.10)	Low (<3.10)
High(>3.46)	21(17.50)	13(10.83)	2(1.67)
Average(3.46-3.10)	7(5.83)	27(22.50)	10(8.33)
Low(<3.10)	0(0.00)	8(6.67)	32(26.67)

$\chi^2=70.75$, significant at 0.05, d.f. = 4
 Figures in parentheses indicate percentages

Table 8: Association between 'Knowledge of Cognition' and 'Regulation of Cognition' in adolescent girls (n=120)

I. Knowledge of cognition (mean score)	II. Regulation of cognition (mean score)		
	High (>3.46)	Average (3.46-3.10)	Low (<3.10)
High(>3.46)	53(44.17)	2(1.67)	1(0.83)
Average(3.46-3.10)	10(8.33)	15(12.50)	4(3.33)
Low(<3.10)	2(1.67)	11(9.17)	22(18.33)

$\chi^2= 91.55$, significant at 0.05, d.f. =4
 Figures in parentheses indicate percentages

cluded were 'Knowledge of Cognition' and 'Regulation of Cognition'. Academic performance was taken as dependent variable.

The results thus obtained are presented in Table 9 which indicate how the academic performance is influenced by the two components of metacognition (independent variables). It was found that collectively both the independent variables contributed positively and significantly to improve the academic performance of the rural adolescents. The regression coefficient ($\hat{\alpha}$) values indicated that 'Regulation of Cognition' (13.57) contributed more than 'Knowledge of Cognition' (11.09). Therefore, it was observed that both the independent variables had significant contribution (t-value= 7.81* and 5.29*; p< 0.05) towards the academic performance of rural adolescents. Furthermore, it clearly depicted the significant correlation between academic achievement and two dimensions of metacog-

nition as it was found that with the unit enhancement of 'Knowledge of Cognition' and 'Regulation of Cognition', the academic achievement enhanced 11.09 and 13.57 times, respectively. Both the variables combined explained for 23 per cent contribution towards academic achievement of the rural adolescents.

CONCLUSION

Therefore, the results indicate that the contribution of the two components of metacognition is imperative for good academic performance and successful learning in adolescents. Hence, the parents and teachers should try to create metacognitive environments for the children/learners, where they are able to acquire the metacognitive skillfulness gradually and naturally. This shall certainly go a long way in making them lifelong learners, problem solvers and successful in academics.

It was found that metacognition was significantly associated with academic achievement. The findings revealed that majority of those who had high level of metacognition were also found to be above average in academic performance. However an exception to this finding was seen in case of girls in which 12.50 per cent girls who were high in metacognition but performed below average in academics may be because of being over burdened with household responsibilities in rural settings. Significantly strong association was observed between the two components of metacognition. The adolescents who had high 'Knowledge of Cognition' were also found to be high in 'Regulation of Cognition' and vice-versa. This was found to be true across both the sexes. Both the components of metacognition, that is, 'Knowledge of Cognition' and 'Regulation of Cognition', significantly contributed towards academic achievement of the respondents. However, it was observed that the 'Regulation of Cognition' component contributed slightly more towards academic achievement of rural adolescents.

Table 9: Linear regression analysis of academic performance on different components of metacognition (N=240)

S. No.	Independent variables	Regression coefficient (β)	Standard error of β	t-value	R ² value
I.	Knowledge of Cognition	11.09	2.57	7.81*	0.21
II.	Regulation of Cognition	13.57	2.56	5.29*	0.23

Combined R²= 0.23 Constant = 28.43 F = 36.67* *significant at 0.05

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