

Gender differentials in the impact of learning styles on metacognitive skills of rural adolescents

■ Gagandeep Kaur, Sarita Saini and Deepika Vig

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■ **ABSTRACT** : Metacognition has been described as a reaction to one's own cognitive activity. It also encompasses the methods employed to control one's own cognitive processes; and an enlightenment of how one coordinates, plans, and monitors cognitive processes. Where metacognition is "thinking about thinking", learning styles simply represents "thinking about learning". Learning style can be defined as a preferred way of thinking and processing information and it is unique to the learner. Therefore, the current research focused on exploring the gender differentials in the impact of learning styles on metacognitive skills of rural adolescents. The sample comprised 200 rural school going adolescents (grade 9th and 10th) drawn from the selected Government Senior Secondary Schools of the randomly selected village of Ludhiana-I Block. The subjects were equally distributed across both the grades (grade 9th =100 and grade 10th =100) as well as genders (males= 100 and females =100). VAK Learning Styles Self Assessment Questionnaire (Chislett and Chapman, 2005) and Metacognitive Awareness Inventory (Schraw and Dennison, 1994) were used to collect data. The results indicated that gender had no significant impact on the correlation between metacognition and learning styles of rural adolescents. Further, the sub-component wise analysis of metacognition and learning styles revealed a significantly positive correlation between 'Kinaesthetic learning style' and the 'procedural knowledge', 'conditional knowledge' and 'evaluation' sub-components of metacognition in adolescent boys whereas in girls, a significant positive correlation was found between 'Auditory learning style' and 'conditional knowledge', 'information management strategies' and 'comprehension monitoring' sub-components of metacognition.

■ **KEY WORDS**: Metacognition, Learning styles, Procedural knowledge, Conditional knowledge, Evaluation, Information management strategies, Comprehension monitoring

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See end of the paper for authors' affiliations →

Gagandeep Kaur
Department of Human
Development and Family Studies,
College of Home Science, Punjab
Agricultural University, Ludhiana
(Punjab) India
Email : gondaragagan07@gmail.
com

The term metacognition refers to knowledge about the process of cognition in general as well as the recognition and identification of cognitive processes themselves. On a general level, it includes

knowledge, understanding and access to cognition and cognitive resources (Minnaert and Janssen, 1999). It is characterized as the information and control that an individual has of his own thoughts related with cognitive

skills such as intelligence, reading and memory (Swanson, 1990). Keefe (1982) described learning styles as the cognitive, affective, and physiological traits those serve as fairly stable indicators of how students perceive, interact with and react to the learning condition. They are the distinctive behaviours which serve as indicators of how an individual learns from and adapts to his environment (Gregorc, 1979). Knowledge about learning styles also provides the insight into the learning needs of an individual during the information intake process along with an in depth understanding of their learning attitudes. It also reveals the response to authority which is also a critical determinant of successful effective process.

Furthermore, the learning styles identify reflective or impulsive thinking styles, sequential or simultaneous brain processing and inclinations for either analytic or holistic brain dominance in the learners. Hence, learning styles can be seen as explaining, information 'INPUT' capacities of individuals. This ability cannot be simply described as 'intelligence' but as 'idiosyncratic personal style' because to say someone who learns/reads/works better in dim light with music in the background while chewing or fiddling with something is more/less intelligent than someone who concentrates better in bright light and silence, sitting still and eating/drinking only before or after learning session, is not appropriate. Teachers ought to be aware of this concept and assess their learners' learning styles at the earliest to help them stimulate their different intelligence factors in a way which is conducive to the individual learning styles. When these important aspects are comprehended and incorporated into existing teaching methods, the teacher-taught interaction become more useful and effective.

The identification of differences in preferred learning style and the student's preferences regarding strategies to promote metacognitive skills development in the classroom were probed by Rahman *et al.* (2011). The results revealed that the most preferred metacognitive development activities regardless of dominant learning style were emotional support, teacher's encouragement and motivation and students voice, respectively (the feeling that student's own voice was being heard). Further, the results indicated that students need encouragement from teachers to develop their metacognitive skills. The relationship between intellectual abilities, metacognitive skills and academic performance of rural adolescents was investigated by Kukreja (2014).

The study revealed that majority of the subjects had an average level of metacognition. Gender differentials were found to be non-significant in distribution across the various levels of metacognition. Irrespective of gender, 'metacognitive skills' were found to be significantly impacting the 'Academic Performance' of the rural adolescents, but the impact of 'Intellectual Abilities' on 'Academic Performance' could not be established. The study conducted by Narang (2012) on the impact of metacognition on academic performance of rural adolescents recommended gender differentials in metacognitive skills of rural adolescents having higher level of metacognition as well as better means scores as compared to their male counterparts. Metacognition was found to be significantly associated with academic performance of the subjects but the impact of socio-economic status on metacognition was found to be non-significant. Both the components of metacognition *viz.*, 'Knowledge of cognition' and 'Regulation of cognition' significantly contributed towards the academic performance of the adolescents.

Objectives of the study:

- The following objectives were framed for the study:
- To investigate the relationship between learning styles and metacognition among rural adolescents.
 - To study the gender differentials in the impact of learning styles on metacognitive skills of rural adolescents.

RESEARCH METHODS

A planned and systematic procedure was designed for conducting the investigation, analysis and interpretation of data. The sample was selected from a randomly selected village from the purposively selected Ludhiana-I Block. The sample for the study comprised 200 rural school going adolescents (14-16 years) proportionately drawn from grade 9th and 10th of the selected Government Senior Secondary Schools, during the session 2016-2017 and equally distributed over gender *i.e.* 100 males and 100 females. The respondents were approached in the selected schools with the permission of the Principals during working days and working hours of the schools. The respondents were explained the objectives and significance of the study and were provided with necessary instructions regarding how to respond to each tool.

Tools used to conduct the investigation was as follows:

Personal information sheet:

A personal information sheet was used to document the socio-personal characteristics of the selected subjects of the study.

Metacognitive awareness inventory (MAI):

Metacognitive awareness inventory (MAI) developed by Schraw and Dennison (1994) was adapted for assessing the metacognition of the adolescents. This test has two main components: 'Knowledge about cognition' component includes declarative knowledge, procedural knowledge and conditional knowledge sub-components. Whereas 'Regulation of Cognition' component consists of planning, information management strategies, comprehension monitoring, debugging strategies and evaluation sub-components.

VAK learning styles self assessment questionnaire:

VAK learning styles self assessment questionnaire developed by Chislett and Chapman (2005) was adapted as per the purpose of the study to assess the learning styles of the selected subjects. The scale contains 30 multiple choice statements and focuses on the three broad aspects of learning styles *i.e.* visual learning style, auditory learning style and kinaesthetic learning style.

■ RESEARCH FINDINGS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under following sub-heads:

I-Socio-personal characteristics of the respondents:

The socio- personal profile of the adolescents selected for the study is presented in Table 1 which pertains to selected socio-personal variables such as age, birth order, number of siblings, education and occupation of the parents, type and size of the family.

Age :

The adolescents were unevenly distributed over the age that is 14-16 years with a major proportion falling in 16 years age group (40.00%) followed by 32.00 per cent in 15 years and only 28 per cent in the 14 years of age

group.

Number of siblings :

A probe into the number of siblings revealed that 50.00 per cent of the adolescents were having one sibling, 32.50 per cent of them were having two siblings where as 14 per cent had three and even more than three siblings. However, about 8.50 per cent were the only child of their parents. The trend was comparable for both boys and girls.

Parental education :

An overview of educational qualifications of parents of the adolescents unveils that the higher proportion of the adolescents (41.00%) reported that their fathers were educated upto +2 and 27.50 per cent divulged that their father were matriculate followed by 22.50 per cent who were educated upto 5th class. However, 6.50 per cent of respondents reported to have illiterate fathers and only 2 per cent adolescents had fathers who were graduates.

Maternal Education :

Education of mothers of adolescents followed almost the similar trend as for their fathers. About 35 per cent of the respondents reported that their mothers were educated upto +2. Whereas 31.50 per cent of them revealed that their mothers were educated upto matric followed by 24.50 per cent educated upto middle class, 7.50 per cent illiterate and only 1.50 per cent of mothers were graduates.

Paternal occupation :

Data pertaining to the occupation of parents of the adolescents revealed that their fathers were engaged in different occupations such as farming, business and labour. Most of them (55.50%) reported that their father were engaged in farming and labour (32.50%) and very few of the adolescents revealed that their fathers were involved in business (5.50%) and service (5.00%).

Maternal occupation :

On the other hand 53.50 per cent of the adolescents divulged that their mothers were housewives followed by 24.00 per cent in farming and 20.00 per cent were engaged in labour work. Only, 2.50 per cent of adolescents reported that their mothers were in service.

Family type :

Data relating to family type of the adolescents revealed that a higher proportion of adolescents (62.50%) belonged to joint families and rest of them (37.50%) belonged to nuclear families. The trend was comparable across both the sexes.

Relationship between learning styles and metacognition among rural adolescents :

The gender-wise correlational analysis of learning

styles and metacognition among rural adolescents is presented in Table 2.

As per Chislett and Chapman (2005) The VAK learning styles model suggests that most people can be divided into one of three preferred styles of learning. Someone with a 'Visual learning style' has a preference for seen or observed things, including pictures, diagrams, demonstrations, displays, handouts, films, flip-chart, etc. These people will use phrases such as 'show me', 'let's have a look at that' and will be best able to perform a

Table 1 : Socio- personal characteristics of the respondents				(n=200)
Socio-personal characteristics	Male (n ₁ =100)	Female (n ₂ =100)	Overall	
	f(%)	f(%)	f(%)	
Age (years)				
14	27 (27)	29 (29)	56 (28)	
15	36 (36)	28 (28)	64 (32)	
16	37 (37)	43 (43)	80 (40)	
Only child	12 (12)	5 (5)	17 (8.5)	
No. of siblings				
One	45 (45)	55 (55)	100 (50)	
Two	30 (30)	35 (35)	65 (32.5)	
More than two	13 (13)	15 (15)	28 (14)	
Paternal education				
Illiterate	6 (6)	7 (7)	13 (6.5)	
Middle	23 (23)	22 (22)	45 (22.5)	
Matriculate	28 (28)	29 (29)	57 (27.5)	
+2	40 (40)	42 (42)	82 (41)	
Graduate	3 (3)	1 (1)	4 (2)	
Maternal education				
Illiterate	7 (7)	8 (8)	15 (7.5)	
Middle	25 (25)	24 (24)	49 (24.5)	
Matriculate	31 (31)	32 (32)	63 (31.5)	
+2	36 (36)	34 (34)	70 (35)	
Graduate	1 (1)	2 (2)	3 (1.5)	
Paternal occupation				
Business	5 (5)	6 (6)	11 (5.5)	
Service	5 (5)	5 (5)	10 (5)	
Farming	56 (56)	55 (55)	111 (55.5)	
Labourer	32 (32)	33 (33)	65 (32.5)	
Maternal occupation				
House wife	54 (54)	53 (53)	107 (53.5)	
Service	3 (3)	2 (2)	5 (2.5)	
Farming	25 (25)	23 (23)	48 (24)	
Labourer	18 (18)	22 (22)	40 (20)	
Family type				
Nuclear	40 (40)	35 (35)	75 (37.5)	
Joint	60 (60)	65 (65)	125 (62.5)	

*Figures in parentheses indicate percentages

new task after reading the instructions or watching someone else do it first. These are the people who will work from lists and written directions and instructions. Whereas, someone with an ‘Auditory learning style’ has a preference for the transfer of information through listening: to the spoken word, of self or others, of sounds and noises. These people will use phrases such as ‘tell me’, ‘let’s talk it over’ and will be best able to perform a new task after listening to instructions from an expert. These are the people who are happy being given spoken instructions over the telephone, and can remember all the words to songs that they hear! But someone with a ‘Kinaesthetic learning style’ has a preference for physical experience - touching, feeling, holding, doing, practical hands-on experiences. These people will use phrases such as ‘let me try’, ‘how do you feel?’ and will be best able to perform a new task by going ahead and trying it out, learning as they go. These are the people who like to experiment, hands-on, and never look at the instructions first!

Hence, Table 2 describes the strength and direction of the relationship of learning styles with metacognition among adolescent boys and girls. The data presented in

the table indicated that boys showed negative weak correlation between Visual (-0.10) as well as Auditory (-0.05) learning styles and metacognition whereas girls showed positive weak correlation between these two learning styles (0.08 and 0.02, respectively) and metacognition. However, in Kinaesthetic learning style the picture was opposite, where boys showed positive weak correlation (0.15) and girls showed negative weak correlation (-0.09) with metacognition. But the overview of the data presented suggested no significant relationship between the two variables under study that is the ‘learning styles’ and ‘metacognition’ across two genders.

These results were in contrast with the study conducted by Mohammadali and Negin (2014) who found a significant correlation between use of metacognitive reading strategy and reading comprehension. That meant, learners could achieve better reading comprehension by using and getting aware of metacognitive reading strategies.

Gender differentials in the impact of learning styles on metacognitive skills of rural adolescents :

Metacognition has two components (Schraw and

Table 2 : Gender-wise correlational analysis of learning styles and metacognition among rural adolescents (n=200)

Sr. No.	Learning styles	Metacognition	
		Boys (r)	Girls (r)
1.	Visual	-0.10	0.08
2.	Auditory	-0.05	0.02
3.	Kinaesthetic	0.15	-0.09
4.	Visual-Auditory	NA	Because of very few respondents in these categories
5.	Visual-Kinaesthetic	NA	
6.	Auditory-Kinaesthetic	NA	
7.	Visual Auditory Kinaesthetic	NA	

r = Correlation co-efficient

Table 3 : Gender-wise correlational analysis of learning styles and sub- components of metacognition among rural adolescents (n=200)

Sub-components of metacognition	Boys (n ₁ =100)			Girls (n ₂ =100)		
	Visual (r)	Auditory (r)	Kinaesthetic (r)	Visual (r)	Auditory (r)	Kinaesthetic (r)
Declarative	-0.11	0.10	0.02	-0.11	0.15	-0.06
Procedural knowledge	-0.16	-0.04	0.21**	-0.15	0.02	0.11
Conditional knowledge	-0.12	-0.05	0.18**	-0.16	0.26**	-0.13
Planning	-0.08	-0.07	0.16	-0.13	0.14	-0.03
Information management strategies	-0.01	-0.11	0.11	-0.05	0.25**	-0.21**
Comprehension monitoring	-0.04	-0.05	0.10	-0.18**	0.23**	-0.09
Debugging strategies	-0.07	-0.04	0.11	-0.04	0.14	-0.11
Evaluation	-0.12	-0.06	0.19**	-0.09	0.14	-0.07

r= Correlation co-efficient

**indicates significance of value at P<0.05

Dennison, 1994). The 'Knowledge about Cognition' component has three sub-components *viz.*, 'Declarative Knowledge' is the Knowledge of one's skills, intellectual resources, and abilities as a learner. 'Procedural Knowledge' requires students know the process as well as when to apply process in various situations. Students can obtain knowledge through discovery, co-operative learning, and problem solving. 'Conditional Knowledge' is the determination under what circumstances specific processes or skills should transfer. The second component of metacognition is 'Regulation of Cognition'. It has five sub-components namely 'Planning' which includes planning, goal setting, and allocating resources prior to learning; 'Information Management Strategies' refers to skills and strategy sequences used to process information more efficiently (e.g., organizing, elaborating, summarizing, selective focusing); 'Comprehension Monitoring' is the assessment of one's learning or strategy use; 'Debugging Strategies' are the strategies to correct comprehension and performance errors and 'Evaluation' refers to analysis of performance and strategy effectiveness after a learning episode.

Now, Table 2 presents the correlation between learning styles and the sub-components of the metacognition among rural adolescent across two sexes. This table indicates that in case of boys 'Kinaesthetic' learning style was significantly and positively correlated with procedural knowledge ($r = 0.21$; $p < 0.05$), conditional knowledge ($r = 0.18$; $p < 0.05$) as well as evaluation ($r = 0.19$; $p < 0.05$) sub-components of metacognition. This implies that boys with 'Kinaesthetic' abilities had better procedural knowledge, conditional knowledge and evaluation.

Whereas in case of girls, 'Visual' learning style was found to be significantly but negatively correlated with the declarative knowledge ($r = -0.11$; $p < 0.05$) sub-component of metacognition. Contrary to this the 'Auditory' learning style was found to be significantly positively correlated with the conditional knowledge ($r = 0.26$; $p < 0.05$), information management strategies ($r = 0.25$; $p < 0.05$) and comprehension monitoring ($r = 0.23$; $p < 0.05$) sub-components of metacognition. However, the 'Kinaesthetic' learning style was found to be significantly negatively correlated with the information management strategies ($r = -0.21$; $p < 0.05$) sub-component of metacognition.

Thus, it could be inferred that girls with better

'Kinaesthetic' learning style had poor 'information management strategies' and with better 'Visual' learning style had poor 'comprehension monitoring'. But as 'Auditory' learning style among adolescent girls improved, their comprehension monitoring and conditional knowledge also improved and *vice versa*.

Shah *et al.* (2013) also reported that students preferred multimodal and more of Kinaesthetic method of learning in spite of geographical differences. It was the responsibility of the instructor and the student to be aware of student learning style preferences to improve learning. As instructors, they ought to assess and understand how to reach all students by understanding how to present information in multiple modes. They could help students more effectively both in and out of the classroom, if we were aware of their learning style and could assist them in determining their preferences. However, students in our set up preferred multimodal and more of Kinaesthetic style of learning.

Conclusion:

Educationists are constantly on the lookout for new and better ways of helping the learners to learn. There is growing acceptance that knowledge of the way students learn is the key to educational improvement. One can change and become a better learner if the learning experiences are designed to suit the learning styles of learner and the suitable metacognitive strategies are developed to be compatible with different learning styles. Therefore, there is a need to assess and understand how to reach all students by understanding how to present information in multiple modes. Thus, it is imperative to provide guidance to parents and teachers to enhance the metacognitive abilities of their wards/ students on the basis of their learning styles. This study would also help the programme planners in developing teaching strategies that would support the preferred learning style of students to enhance their metacognition. Consequently, a practice of metacognitive skills would help in lifelong learning as learners get accustomed to goal setting and strategizing their learning.

Authors' affiliations:

Sarita Saini and Deepika Vig, Department of Human Development and Family Studies, College of Home Science, Punjab Agricultural University, Ludhiana (Punjab) India

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