

Self-regulation and metacognitive skillfulness among adolescents

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■ **ABSTRACT** : The present study aims to investigate the relationship between varying dimensions of self-regulation and the two components of metacognition. Metacognition and self-regulation should be explored as a serious issue in the educational context as both aim at helping learners to think about their own learning more explicitly. The sample for this study comprised 400 adolescents studying in class +1 and +2, exclusively drawn from the Government Senior Secondary Schools of rural and urban areas of Ludhiana and Moga districts of Punjab. The subjects were randomly selected and equally distributed over gender (males=200 and females=200) and locale (urban=200 and rural =200). Metacognitive Awareness Inventory (Schraw and Dennison, 1994) and Self-Regulation Questionnaire (Brown *et al.*, 1999) were used to assess the metacognition and self-regulation of adolescents, respectively. Irrespective of gender and locale, the results of Pearson Correlation analysis revealed a significant positive correlation between overall self-regulation and the components of metacognition (Knowledge about Cognition and Regulation of Cognition) as well as overall metacognition. Similar results were also observed in case of female respondents as well as the rural respondents, where a significant positive correlation was found between self-regulation and metacognition.

■ **KEY WORDS**: Adolescents, Metacognition, Self-regulation

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Self-regulation is the ability of an individual to develop, implement and flexibly maintain planned behaviour in order to achieve one's goals (Kanfer, 1970a and b). In other words, to be self-regulated means setting one's goals and ensuring that the goals set are attained. Other key components of self-regulation are motivation, affect and volition (Boekaerts, 1996). As stated by Zimmerman (1989), learners can be defined as self-regulated to the extent that their goals are achieved cognitively, motivationally and behaviourally by

actively participating in their own learning stages and processes.

Pintrich and De Groot (1990) affirmed three components involved in self-regulated learning, including the metacognitive strategies of students (for planning, monitoring and modifying their cognition), the management and control of their effort in classroom tasks and actual cognitive strategies that students use to learn, remember and understand the material.

Metacognition is basically thinking about thinking.

It is the brain's marvelous ability to self-assess and build awareness of one's own thinking and learning processes. And such awareness helps in building self-efficacy and self-regulation skills with the potential to reshape perspectives of one's own strengths and weaknesses.

Metacognition helps an individual in monitoring his performance and developing plans to work, based on one's learning and also to estimate performance of an individual (Dunlosky and Thiede, 1998). Thus, the concept of metacognition is deeply associated with the process of 'learning to learn'. It is important for learners to imbibe new knowledge in them and to be capable to use, connect and transfer knowledge from one domain to another (Novak and Gowin, 1989). The metacognitive skills enable learners not only to implement these processes, but also to organize study in stages, along with monitoring and evaluating learning activities (Cornoldi, 1995).

According to Flavell who coined the term 'metacognition' in 1979, metacognition has two components 'Metacognitive Knowledge' and 'Metacognitive Regulation'. 'Metacognitive Knowledge' is the knowledge of one's own cognitive processes. It is the knowledge of the students regarding what they know about themselves, under what condition which type of strategies are more useful. Metacognitive knowledge has three sub-components - declarative, procedural and conditional knowledge. However, 'Metacognitive Regulation' is defined as 'the activities an individual performs in order to learn and remember'. These activities can control one's way of thinking and the way he learns. Thus, 'Regulation of Cognition' relates to knowledge about the way one plans a task, implementation of the plan, correcting errors and evaluates learning.

According to Sindhvani and Sharma (2013) metacognitive skills enables the individuals to observe them learning and help them to plan and direct the way of learning. Also, these skills make it easy to select the appropriate method to do the learning task. That's why, students who implement metacognitive skills can fix their goals, control the things to learn, and can use different ways of learning and can alter the strategies they need as per their plan and way of learning.

The conceptual overlap of self-regulation and metacognition needs a thorough analysis of the processes, in order to determine whether metacognition interacts

with motivation and whether these interactions have implications for self-regulation. A recurrent concept in the literature which has come in the limelight now is a close link between metacognition and self-regulated behaviour (Zimmerman and Martinez-Pons, 1990 and Dignath *et al.*, 2008). Metacognition in relation to self-regulation describes a learner's ability to think consciously about their cognition and controlling their cognitive abilities (Zimmerman, 1989). Metacognition is linked to the learner's ability to plan, organize, monitor and evaluate their own learning (Boekearts, 1996 and Zimmerman, 1989).

Furthermore, educational philosopher John Dewey believed that an individual actually learns more from 'thinking about his experiences' rather than from the 'actual experiences' themselves. Thus, this idea is not new but the practice of examining and reflecting on experiences, or metacognition, dates back to Socrates and continues to be explored by today's neuroscientists.

The unexamined life is not worth living—
Socrates

So, against this backdrop, the present study has been planned with following objectives to explore the relationship between self-regulation and metacognition among adolescents and to study locale-wise as well as gender-wise correlation between varying dimensions of self-regulation and components of metacognition among adolescents.

■ RESEARCH METHODS

Location:

The present study was conducted in the urban and rural areas of randomly selected two districts of Punjab *i.e.* Ludhiana and Moga. For the selection of the sample for the present study thirteen Government Senior Secondary Schools of urban and rural areas of Ludhiana and Moga districts of Punjab were randomly selected.

Sample:

The final sample comprised of 400 adolescents in the age range of 16-18 years living in intact families drawn using random quota sampling technique. An equal number of males (n=100) and females (n=100) were selected from both rural as well as urban areas of Ludhiana and Moga. The maximum number of adolescents selected from each school was 50 (males=25 and females=25) and each district was 100 (Ludhiana=100 Moga=100).

Procedure:

The sample adolescents were approached in the school premises after seeking the permission from the respective Principals of the selected schools. From each school a required number of adolescents were selected randomly. The adolescents thus selected from the selected schools constituted the final sample of 400. The data collection was completed in two steps. The students were divided in small groups. The copies of the Metacognitive Awareness Inventory and Self-Regulation Questionnaire were distributed and necessary instructions were given. Although, the scales were translated into Punjabi vernacular, yet the items were read out loudly and their meaning was explained with examples for the better comprehension of respondents.

Measures:

Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994) was used to investigate various aspects of metacognition. Self-Regulation Questionnaire (SRQ) developed by Brown *et al.* (1999) was used to assess the ability of adolescents to develop, implement and flexibly maintain planned behaviour in order to achieve one's goals in personal as well as in educational settings.

Analysis:

The collected data were finally classified and tabulated as per the objectives and analyzed using Karl Pearson's co-efficient of correlation.

RESEARCH FINDINGS AND DISCUSSION

As per the envisaged objectives of the study the

results are reported in the Table 1 to 5.

Correlation between different dimensions of self-regulation and components of metacognition among adolescents :

As per the first objective of the study the data put forth in Table 1 depicts correlation between the two components of metacognition and different dimensions of self-regulation. The data presented revealed that 'Regulation of Cognition' component of metacognition was significantly positively correlated with four dimensions of self-regulation *viz.*, 'receiving' ($r=0.27$; $p\leq 0.01$), 'searching' ($r=0.18$; $p\leq 0.05$), 'implementing' ($r=0.17$; $p\leq 0.10$), assessing ($r=0.21$; $p\leq 0.01$). Thus, it could be concluded that being aware about planning, understanding as well as evaluating the learning processes helped adolescents to be more attentive towards new information, available options and also to implement and assess the received information and using best options to achieve their goals and *vice-versa*.

However, the overall metacognition was also found to be significantly positively correlated with 'receiving' ($r=0.27$; $p\leq 0.01$), 'searching' ($r=0.21$; $p\leq 0.01$), 'implementing' ($r=0.16$; $p\leq 0.10$), assessing ($r=0.23$; $p\leq 0.05$). This indicated that use of metacognitive skills and strategies by adolescents also had positive impact on how they received particular information and implemented it to look up for better options to solve their problems. But no significant correlation was observed between components of metacognition and metacognition with triggering and evaluating dimensions of self-regulation. Also, the overall self-regulation and overall metacognition ($r=0.29$; $p\leq 0.01$) as well as its both

Table 1 : Correlation between different dimensions of self-regulation and components of metacognition among adolescents (n=400)

Dimensions of self-regulation	Components of metacognition		
	Component-I Knowledge about cognition (r)	Component-II Regulation of cognition (r)	Overall metacognition (r)
Receiving	0.12	0.27***	0.27***
Evaluating	0.07	0.13	0.13
Triggering	0.08	0.08	0.10
Searching	0.15	0.18**	0.21**
Planning	0.07	0.14	0.14
Implementing	0.07	0.17*	0.16*
Assessing	0.13	0.21**	0.23**
Overall self-regulation	0.16*	0.27***	0.29***

r = correlation co-efficient

*, ** and *** indicate significance of values at $P\leq 0.10$, ≤ 0.05 and ≤ 0.01 , respectively

components that is ‘Knowledge about Cognition’ ($r=0.16$; $p\leq 0.10$) and ‘Regulation of Cognition’ ($r=0.27$; $p\leq 0.01$) were found to be positively significantly related. It could be deduced from this that metacognitive skills helped to improve self-regulatory skills of adolescents. However, ‘Knowledge about Cognition’ component of metacognition was not found to have significant relationship with any of the dimensions of self-regulation except for overall self-regulation.

Paris and Oka (1986) pointed out that student should know various kinds of efficient strategies for the learning and the essential success. Self-regulation strategies are the necessary instruments for student success and have a close relationship with their metacognitive skills and the academic achievement.

Locale-wise correlational analysis of varying dimensions of Self-regulation and components of Metacognition among Adolescents.

As per the second objective of the study the locale-wise correlational analysis of varying dimensions of self-

regulation and two components of metacognition has been presented under Table 2 and 3 for the urban and rural adolescents, respectively. Data presented in the Table 2 depicts the relationship between the two components of metacognition and different dimensions of self-regulation among urban adolescents.

The data presented indicated that ‘Regulation of Cognition’ component of metacognition had significantly positive correlation with the three dimensions of Self-regulation viz., ‘receiving’ ($r=0.25$; $p\leq 0.01$), ‘searching’ ($r=0.22$; $p\leq 0.05$) ‘assessing’ ($r=0.25$; $p\leq 0.01$). Similarly, overall metacognition was also found to be significantly positively correlated with the three dimensions of self-regulation that is receiving’ ($r=0.23$; $p\leq 0.05$), ‘searching’ ($r=0.25$; $p\leq 0.01$) ‘assessing’ ($r=0.22$; $p\leq 0.05$).

Further, a significant positive correlation was also seen in the overall metacognition ($r=0.23$; $p\leq 0.05$) and ‘Regulation of Cognition’ ($r=0.23$; $p\leq 0.05$) component of metacognition and overall self-regulation. ‘Knowledge about Cognition’ component of metacognition was not

Table 2: Correlation between different dimensions of self-regulation and two components of metacognition among urban adolescents (n=200)

Dimensions of self-regulation	Components of metacognition		Overall metacognition (r)
	Component-I	Component-II	
	Knowledge about cognition (r)	Regulation of cognition (r)	
Receiving	0.06	0.25***	0.23**
Evaluating	0.06	0.01	0.03
Triggering	0.05	0.11	0.12
Searching	0.14	0.22**	0.25***
Planning	0.03	0.05	0.06
Implementing	0.00	0.10	0.08
Assessing	0.03	0.25***	0.22**
Overall self-regulation	0.09	0.23**	0.23**

r = correlation co-efficient

*, ** and *** indicate significance of values at $P\leq 0.10$, ≤ 0.05 and ≤ 0.01 , respectively

Table 3 : Correlation between different dimensions of self-regulation and components of metacognition among rural adolescents (n=200)

Dimensions of self-regulation	Components of metacognition		Overall metacognition
	Component-I	Component-II	
	Knowledge about cognition (r)	Regulation of cognition (r)	
Receiving	0.19**	0.30***	0.32***
Evaluating	0.06	0.22**	0.20**
Triggering	0.09	0.04	0.08
Searching	0.17*	0.17*	0.21**
Planning	0.11	0.21**	0.21**
Implementing	0.12	0.22**	0.22**
Assessing	0.22**	0.18*	0.25***
Overall self-regulation	0.22	0.31**	0.34***

r = correlation co-efficient

*, ** and *** indicate significance of values at $P\leq 0.10$, ≤ 0.05 and ≤ 0.01 , respectively

found to be significantly related with any of the dimension of self-regulation.

In consonance with the results of this study, Fox and Riconscente (2008), in their review also concluded the writings of James, Piaget, and Vygotsky, that “metacognition and self-regulation are parallel and intertwining constructs that are clearly distinct yet mutually entailed both developmentally and in their functions in human thought and behavior neither subsumes nor subordinates the other”.

Table 3 depicts correlation between the two components of metacognition and different dimensions of self-regulation among rural adolescents. ‘Knowledge about Cognition’ component of metacognition was significantly positively correlated with ‘receiving’ ($r=0.19$; $p\leq 0.05$), ‘searching’ ($r=0.17$; $p\leq 0.05$) as well as ‘assessing’ ($r=0.22$; $p\leq 0.05$) dimensions of self-regulation. Whereas, ‘Regulation of Cognition’ component- II of metacognition was found to have a significant positive correlation with the six dimensions of self-regulation viz., ‘receiving’ ($r=0.19$; $P\leq 0.05$), ‘evaluating’ ($r=0.22$; $p\leq 0.05$), ‘searching’ ($r=0.17$; $p\leq 0.10$), ‘planning’ ($r=0.21$; $p\leq 0.05$) ‘implementing’ ($r=0.22$; $p\leq 0.10$) as well as assessing ($r=0.18$; $P\leq 0.05$). Also, Similar results were observed in overall metacognition where again all the dimensions of self-regulation except triggering were observed to have a significant positive correlation with the overall metacognition (‘receiving’ ($r=0.32$; $P\leq 0.01$), ‘evaluating’ ($r=0.20$; $p\leq 0.05$), ‘searching’ ($r=0.21$; $p\leq 0.05$), ‘planning’ ($r=0.21$; $p\leq 0.05$) ‘implementing’ ($r=0.22$; $p\leq 0.10$) as well as assessing ($r=0.25$; $P\leq 0.01$).

These results highlight that overall self-regulation

was significantly positively correlated with overall metacognition ($r=0.34$; $p\leq 0.01$) as well as both the components of metacognition ‘Knowledge about Cognition’ ($r=0.22$; $P\leq 0.05$) as well as ‘Regulation of Cognition’ ($r=0.31$; $p\leq 0.05$).

The similar results were found in the studies done by Sperling *et al.* (2004) and Luwel *et al.* (2003) which pointed out that metacognitive knowledge and regulation influence decisions which strategy to use. Both studies found that the engagement in metacognitive activities was positively related to the use of all relevant strategies. Decisions on strategy use imply that the strategy is adapted to the task and to the stage of the task performance.

Gender-wise correlational analysis of varying dimensions of self-regulation and components of metacognition among adolescents :

As per the third objective of the study the gender-wise correlational analysis of varying dimensions of self-regulation and two components of metacognition has been presented under Table 4 and 5 for the male and female adolescents, respectively. Table 4 depicts correlation between the two components of metacognition and different dimensions of self-regulation among adolescent males. Component-I *i.e.* ‘Knowledge about Cognition’ of metacognition was observed to be not correlated with any of the dimensions of self-regulation. Whereas, ‘Regulation of Cognition’ component-II of metacognition had a significant positive correlation with ‘receiving’ ($r=0.37$; $P\leq 0.01$), ‘searching’ ($r=0.26$; $p\leq 0.01$), ‘implementing’ ($r=0.20$ $p\leq 0.05$), ‘assessing’ ($r=0.29$; $p\leq 0.05$) dimensions of self-regulation. However, overall

Dimensions of self-regulation	Components of metacognition		Overall metacognition (r)
	Component-I Knowledge about cognition (r)	Component-II Regulation of cognition (r)	
Receiving	0.14	0.37***	0.35***
Evaluating	0.09	0.15	0.14
Triggering	0.09	0.14	0.14
Searching	0.09	0.26***	0.24***
Planning	0.03	0.14	0.12
Implementing	0.06	0.20**	0.18**
Assessing	0.07	0.29***	0.25***
Overall self-regulation	0.12	0.35***	0.32***

r = correlation co-efficient

*, ** and *** indicate significance of values at $P\leq 0.10$, ≤ 0.05 and ≤ 0.01 , respectively

metacognition also had a significant positive correlation with ‘receiving’ ($r=0.35$; $p\leq 0.01$), ‘searching’ ($r=0.24$; $p\leq 0.05$), ‘implementing’ ($r=0.18$; $p\leq 0.05$) and assessing ($r=0.25$; $p\leq 0.05$) dimensions of self-regulation.

The results highlight that overall self-regulation was significantly positively correlated with overall metacognition ($r=0.32$; $p\leq 0.01$) as well as the component II ‘Regulation of Cognition’ ($r=0.35$; $p\leq 0.01$) of metacognition. ‘Knowledge about Cognition’ component of metacognition was not found to be significantly related with any of the dimension of self-regulation.

In congruence with the results of this study Schunk and Zimmerman (1994) also observed that the self-regulated readers were found good at anticipating and predicting information, looking for information relevant to their goals, jumping forward/back to look for particular information. They also stated that such readers successfully make use of cognitive and metacognitive strategies and they are always engaged in self-regulated learning as well, knowing what to do, how to do, when to do. These learners plan very well and know how, when and where to use the strategies.

Table 5 depicts correlation between the two components of metacognition and different dimensions of self-regulation among adolescent females. The ‘Regulation of Cognition’ *i.e.* component-II of metacognition had a significant positive correlation with ‘receiving’ ($r=0.19$; $p\leq 0.05$) ‘searching’ ($r=0.20$; $p\leq 0.05$), ‘implementing’ ($r=0.16$; $p\leq 0.10$) as well as ‘assessing’ ($r=0.18$; $p\leq 0.05$) dimensions of self-regulation. Also, overall metacognition also had a significant positive correlation with ‘receiving’ ($r=0.21$; $p\leq 0.05$), ‘searching’ ($r=0.19$; $p\leq 0.05$), ‘implementing’ ($r=0.16$; $p\leq 0.10$) and

assessing ($r=0.19$; $p\leq 0.05$) dimensions of self-regulation.

The results highlight that overall self-regulation was significantly positively correlated with overall metacognition ($r=0.25$; $p\leq 0.01$) as well as both the components ‘Knowledge about Cognition’ ($r=0.19$; $p\leq 0.05$) as well as ‘Regulation of Cognition’ ($r=0.20$; $p\leq 0.05$) of metacognition.

The findings are in line with the study conducted by Dunlosky and Thiede (1998) who also reported that metacognition and self-regulation are broadly conceptualized within the broad context of all activities for humans of all ages and points of development. Whereas, in comparison, self-regulated learning is limited to students in academic contexts. Also, the self-regulatory student’s engagement in metacognitive activities engenders the optimal adoption of strategies to the requirements of the task. For this all study strategies may be deployed. Various authors have found that the use of study strategies was positively related to exam scores (Pintrich and DeGroot, 1990; Elliot *et al.*, 1999 and Wolters, 2004).

Conclusion :

Learners often remain confused about how to optimize their learning and improve their chances of academic success. Most institutions focus exclusively on content to correct academic deficiencies of students but very little focus is on metacognitive strategies to make students aware of their individual patterns of thinking and learning. The more students understand how they think about and process their experiences, the better chance they have to cope-up with their academic deficiencies. Cultivating a self-awareness of one’s own

Table 5 : Correlation between different dimensions of self-regulation and two components of metacognition among adolescent females (n=200)

Dimensions of self-regulation	Components of metacognition		Overall metacognition
	Component-I Knowledge about cognition (r)	Component-II Regulation of cognition (r)	
Receiving	0.11	0.19**	0.21**
Evaluating	0.05	0.11	0.11
Triggering	0.05	0.00	0.02
Searching	0.11	0.20**	0.19**
Planning	0.11	0.15	0.14
Implementing	0.08	0.16*	0.16*
Assessing	0.12	0.18**	0.19**
Overall self-regulation	0.19**	0.20**	0.25***

r = correlation co-efficient

*, ** and *** indicate significance of values at $P\leq 0.10$, ≤ 0.05 and ≤ 0.01 , respectively

psycho-social experiences also increases awareness among students of the many other competencies such as motivation, self-regulation, resilience and self-reliance. And all too often students are unaware of their own extraordinary competencies and fail to unleash their potential by rising above the obstacles.

The results of this study also highlight a significant positive correlation between overall self-regulation and both the components of metacognition (Knowledge about Cognition and Regulation of Cognition) as well as overall metacognition in the total sample irrespective of gender and locale. Similar results were observed among female as well as the rural respondents. Irrespective of gender the 'Regulation of Cognition' component of metacognition as well as overall metacognition were found to be significantly positively correlated with four dimensions of self-regulation *viz.*, receiving, searching, implementing and assessing. Thus, it can be inferred that being self-regulated in life helps students to develop metacognitive skills or *vice-versa*. So, teachers and parents should encourage learners to be self-regulated in life and to inculcate the habit of using metacognitive skills.

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