SUMMARY

INTRODUCTION

"Metacognition" is one of the latest buzz words in educational psychology, but what exactly is metacognition? The length and abstract nature of the word makes it sound intimidating, yet it is not as daunting a concept as it might seem. We engage in metacognitive activities everyday. Metacognition enables us to be successful learners and has been associated with intelligence (e.g., Borkowski, Carr, & Pressley, 1987; Sternberg, 1984, 1986a, 1986b). Metacognition refers to higher order thinking which involves active control over the cognitive processes engaged in learning. Activities such as planning how to approach a given learning task, monitoring comprehension and evaluating progress toward the completion of a task are metacognitive in nature. Because metacognition plays a critical role in successful learning, it is important to study metacognitive activity and development to determine how students can be taught to better apply their cognitive resources through metacognitive control. "Metacognition" is often simply defined as "thinking about thinking." In actuality, defining metacognition is not that simple. Although the term has been part of the vocabulary of educational psychologists for the last couple of decades and the concept for as long as humans have been able to reflect on their cognitive experiences, there is much debate over exactly what metacognition is. One reason for this confusion is the fact that there are several terms currently used to describe the same basic phenomenon (e.g., self-regulation, executive control), or an aspect of that phenomenon (e.g., meta-memory) and these terms are often used interchangeably in the literature. While there are some distinctions between definitions (see Van Zile-Tamsen, 1994, 1996 for a full discussion), all emphasize the role of executive processes in the overseeing and regulation of cognitive processes.

The term "metacognition" is most often associated with John Flavell, (1979). According to Flavell (1979, 1987), metacognition consists of both metacognitive knowledge and metacognitive experiences or regulation. Metacognitive knowledge refers to acquired knowledge about cognitive processes, knowledge that can be used to control cognitive processes. Flavell further divides metacognitive knowledge into
three categories: knowledge of person variables, task variables and strategy variables. It has been over 30 years since the notion of metacognition was introduced into the field of psychology by John Flavell in 1979. Research activity in metacognition began with John Flavell, who is considered to be the 'father of the field' and thereafter a considerable amount of empirical and theoretical research dealing with metacognition can be registered. There are three main areas of research in which metacognition have prominent role: developmental psychology, with emphasis on theory of mind; experimental psychology, focusing mainly on meta-memory; and educational psychology, with emphasis on self-regulated learning. However, there is also significant work in neuropsychology that connects metacognition with executive functions and pre-frontal brain areas. Another line of research connects metacognition with social cognition, as well as with co-regulation and other regulation of behaviour and cognition. More recent developments include the study of metacognition in clinical psychology. The variety of areas and perspectives through which metacognition is being studied is due to the fact that metacognition is inextricably woven with awareness of mental states and with consciousness. In humans, it is at the roots of every day memory and of scientific thinking, as well as of social interactions that require awareness of one's and others' thinking. Distinction in metacognition is executive management and strategic knowledge. Executive management processes involve planning, monitoring, evaluating and revising one's own thinking processes and products. Strategic knowledge involves knowing what (factual or declarative knowledge), knowing when and why (conditional or contextual knowledge) and knowing how (procedural or methodological knowledge). Both executive management and strategic knowledge metacognition are needed to self-regulate one's own thinking and learning (Hartman, 2001).

Finally, there is a distinction between domain general and domain-specific metacognition. Domain general refers to metacognition which transcends particular subject or content areas, such as setting goals. Domain specific refers to metacognition which is applied in particular subject or content areas, such as editing an essay or verifying one's answer to a mathematics problem. Problem solving is a complex behavior. Regardless of how much experience or knowledge a problem-
solver has, each new problem situation is in some ways unique, requiring creative application of strategies for posing, solving and resolving the problem at hand. Metacognition is the awareness and understanding of one's self as a thinker. Expert problem-solvers and effective thinkers of all kinds are usually self-aware thinkers. They plan strategies for attacking thinking problems. When they hit blind alleys, they stop, analyze and reflect. Effective thinkers pose alternatives for themselves and choose among them. Students' ability to reflect on their thinking "as thinking" and to analyze their own strategies are their metacognitive skills. Surprisingly, metacognitive awareness is not uniformly developed in students. In reading, even college age students are unaware of how they can approach texts, plan their studying, or work through problems that have stumped them. In writing, inexpert writers may follow one procedure again and again without flexibility, even in the face of persistent failure. However, teachers can promote awareness of strategies for thinking by engaging their students in activities that require reflection. Students can keep and share a "process log" where they write about the processes they employ in writing, reading, or problem-solving generally. As students share their entries, they gain an awareness of alternatives to their own processes and the teacher can direct them to consider specific strategies. Teachers, as expert readers and writers, can also make their thinking strategies explicit by "thinking-aloud" with students as they read and write together. Group work or discussion time can also regularly include a "process observer," namely a participant who agrees to pay attention to how the interaction progresses and to report to the group an analysis of its process. Activities like these, that require students to make the sometimes invisible work of thinking visible and explicit, help all students to understand that as thinkers, they are in charge. More purposeful, flexible and creative problem solving is the result.

Self-esteem gives you the courage to try new things and the power to believe in yourself. It lets you respect yourself, even when you make mistakes. And when you respect yourself, adults and other kids usually respect you, too. Having positive self-esteem can also help you can learn to make healthy choices about your mind and body? If you think you're important, you'll be less likely to follow the crowd if your friends are doing something wrong or dangerous. If you have positive self-esteem,
you know you're smart enough to make your own decisions. You value your safety, your feelings, your health — your whole self! Positive self-esteem helps you know that every part of you is worth caring for and protecting.

**RATIONALE OF THE STUDY**

Adolescence is a period of stress and strain. Lots of students face problem during this phase in their life. Adolescents exhibits high rate of anti-social behavior like stubbornness, demandingness, arguing, teasing, loudness, threatening, cruelty, fighting, disobedience and sassiness. There must be some hidden causes of these problematic acts, the significant impairment of everyday functioning of youngsters with unsocialized aggressive conduct disorder (term given by Quay in 1986) are not a good sign of their future. Such adolescents exhibit relatively pattern of aggressive behavior over time, their problems do not tend to dissipate, but to continue into adulthood. Although for boys, a history of serious antisocial conduct before age 15 increases the chances of Psychopathology (criminals behavior, alcohol and drug abuse) in adulthood, for girls probability of depression and phobias increases (Robins 1986). These disorders of adolescents not only affect the lives of those who suffer but also live of others.

There is a common saying- “The wheel, that squeaks get the grease”. Significant efforts must be made to find the solution of these problematic behaviours. Education Psychologists considered metacognition as the pinnacle of personal growth metacognition is typically used as a tool to deal with every day problems and maintain the self-esteem of adolescents. After reviewing the literature the investigator considers lack of problem solving abilities and self-esteem as one of the major cause of their disruptive acts. Whereas problem solving ability is known as the climax of human abilities & plays an important role in present academic performance and social aspect. In the other hand, self-esteem is viewed both as personality trait a psychological state. It is also considered as important aspect self development. There skills can be developed during life time by providing suitable environmental factor and experience. In the present study investigator tries to study the meta-cognition in relation to problem solving and self-esteem. As we know future of man is not solely
determined by his genetic endowment, but also by the environmental forces operative around him. Right from birth, he is embedded in an ever-enlarging series of concentric spheres (Bronfenbrenner, 1979) of which the family forms the closest and the most direct source of influence.

STATEMENT OF THE PROBLEM

“METACOGNITION AMONG SENIOR SECONDARY STUDENTS IN RELATION TO THEIR PROBLEM SOLVING ABILITY AND SELF-ESTEEM.”

OBJECTIVES OF THE STUDY

The present study is designed to realize the following objectives:-

O₁. To study the relationship between metacognition and problem solving ability among senior secondary students.
O₂. To study the relationship between metacognition and self- esteem among senior secondary students.
O₃. To study the difference between the mean scores of metacognition among rural and urban senior secondary students.
O₄. To study the difference between the mean scores of metacognition among male and female senior secondary students.
O₅. To study the difference between the mean scores of metacognition among senior secondary students having high and low problem solving ability.
O₆. To study the difference between the mean scores of metacognition among senior secondary students having high and low self-esteem.
O₇. To study the difference between mean scores of metacognition among male senior secondary students having high and low problem solving ability.
O₈. To study the difference between mean scores of metacognition among female senior secondary students having high and low problem solving ability.
O₉. To study the difference between mean scores of metacognition among male senior secondary students having high and low self-esteem.
O_{10}. To study the difference between mean scores of metacognition among female senior secondary students having high and low self-esteem.

O_{11}. To study the difference between the mean scores of metacognition among rural senior secondary students having high and low problem solving ability.

O_{12}. To study the difference between the mean scores of metacognition among urban senior secondary students having high and low problem solving ability.

O_{13}. To study the difference between the mean scores of metacognition among rural senior secondary students having high and low self-esteem.

O_{14}. To study the difference between the mean scores of metacognition among urban senior secondary students having high and low self-esteem.

HYPOTHESES OF THE STUDY

H_{01} There is no significant relationship between metacognition and problem solving ability among senior secondary students.

H_{02} There is no significant relationship between metacognition and self-esteem among senior secondary students.

H_{03} There is no significant difference between the mean scores of metacognition among rural and urban senior secondary students.

H_{04} There is no significant difference between the mean scores of metacognition among male and female senior secondary students.

H_{05} There is no significant difference between the mean scores of metacognition among senior secondary students having high and low problem solving ability.

H_{06} There is no significant difference between the mean scores of metacognition among senior secondary students having high and low self-esteem.

H_{07} There is no significant difference between mean scores of metacognition among male senior secondary students having high and low problem solving ability.

H_{08} There is no significant difference between mean scores of metacognition among female senior secondary students having high and low problem solving ability.
There is no significant difference between mean scores of metacognition among male senior secondary students having high and low self-esteem.

There is no significant difference between mean scores of metacognition among female senior secondary students having high and low self-esteem.

There is no significant difference between the mean scores of metacognition among rural senior secondary students having high and low problem solving ability.

There is no significant difference between the mean scores of metacognition among urban senior secondary students having high and low problem solving ability.

There is no significant difference between the mean scores of metacognition among rural senior secondary students having high and low self-esteem.

There is no significant difference between the mean scores of metacognition among urban senior secondary students having high and low self-esteem.

INDEPENDENT AND DEPENDENT VARIABLES

(a) Independent Variables:
   - Problem Solving Ability
   - Self-Esteem.

(b) Dependent Variable:
   - Metacognition

METHOD USED

In the present investigation Descriptive Survey Method has been employed to find the effect of problem solving ability and self-esteem on metacognition. The present piece of research was a descriptive survey. The main purpose of this work is to study the metacognition among senior secondary students in relation to their problem solving ability and self-esteem in the schools of Jhajjar district. It involves interpretation comparison measurement, classification, understanding a solution of significant educational problem.
POPULATION AND SAMPLE

The students of both rural and urban areas schools of district Jhajjar constituted the population of the subjects in the present study. Owing to certain problems was not feasible to study the whole population so the parameters have been estimated by the sample statistics. Various sampling methods are available to pick up a representative sample. The stratified sample method was used to draw the sample for the present study. The Jhajjar district constituted the area of the study. The stratified sample method was used to draw the school sample for the present study. The selection of schools was made on stratified basis after processing list to all the schools in Jhajjar district. While the investigator visited each school, he obtained the list of all students. Also out of this list, he randomly picked up sixteen students from each school. If a student earmarked for this study or was not found present in the school, it was later on conducted at his residence in the same way, if someone refused to co-operate with the study, another student was replaced on the random basis. But such cases were very few and rarely noticed. Thus 320 students from different schools of rural and urban area with 16 students from each school constituted the sample for this study. Considering the resources limitations, it was decided to include the two types of schools: rural schools and urban schools were taken. The sample of 320 students includes both males as well as females. As it was impractical to test and evaluate every school so, the sample taken is 320 students from 20 schools.

   i) 10 from rural
   ii) 10 from urban area

SAMPLE

SAMPLE Design [320 Students: 160 male (80 urban + 80 rural) + 160 female (80 urban + 80 rural)]

The present study is conducted on a sample of 320 senior secondary students in Jhajjar district only. The sample is selected by stratified random sampling technique from the population of senior secondary students.
TOOLS USED FOR THE STUDY

- Meta Cognition Inventory (MCI) by Punita Govil (2003). This test available in both mediums, i.e. in English and Hindi. This scale consists of 30 items.
- Problem Solving Ability Test (PSAT-d) by L. N. Dubey (2006). This test available in both mediums, i.e. English and Hindi. This test consists 20 items.
- Self-Esteem Inventory (SEI) by G.P. Thakur (1989). The inventory has two parts. Part one has 29 items and measures personally perceived self. The second part of the inventory, i.e., socially perceived self was used, which has 30 items.

COLLECTION OF THE DATA

After looking into the nature of study it was necessary to obtain the information of every item included in the questionnaires. The data was collected individually. The researcher went to the schools to contact the teachers for the selection of the students. He established proper rapport with them and then administered the questionnaires. The selection of students was done on random basis. Thus the investigator visited the schools and collected the data himself from each school 16 students were selected.

STATISTICAL TECHNIQUES USED

The Mean and Standard Deviation is calculated of the entire test conducted on the students. Karl Pearson’s Product Moment Correlation was used to see the relationship of metacognition with problem solving ability and self-esteem and ‘t’ test was used to observe the significant difference among senior secondary students in relation to their gender and locality by using Statistical Package for Social Sciences (SPSS) version 17.

MAIN FINDINGS

1. It was found that there is a positive and significant correlation between Metacognition and Problem solving ability. This shows that as the scores of
Metacognition increases, the problem solving ability scores increases. Less score of problem solving ability shows less metacognition.

2. It was found that there is a positive and significant correlation between Metacognition and self-esteem. This shows that as the scores of Metacognition increases, the Self-esteem scores increases. Less score of self-esteem shows less metacognition.

3. It was found that there is a significant difference between the mean scores of metacognition among rural and urban senior secondary students. It may, therefore, be concluded that urban students have more metacognition in comparison to rural senior secondary students.

4. It was found that there is a significant difference between the mean scores of metacognition among male and female senior secondary students. It may, therefore, be concluded that male students have more metacognition in comparison to female senior secondary students.

5. It was found that there is a significant difference between the mean scores of metacognition among senior secondary students having high and low problem solving ability. It may, therefore, be concluded that students having high problem solving ability have more metacognition in comparison to the students having low problem solving ability.

6. It was found that there is a significant difference between the mean scores of metacognition among senior secondary students having high and low self-esteem. It may, therefore, be concluded that students having high self-esteem have more metacognition in comparison to the students having low self-esteem.

7. It was found that there is a significant difference between the mean scores of metacognition among male senior secondary students having high and low problem solving ability. It may, therefore, be concluded that male students having high problem solving ability have more metacognition in comparison to the male students having low problem solving ability.

8. It was found that there is a significant difference between the mean scores of metacognition among female senior secondary students having high and low
problem solving ability. It may, therefore, be concluded that female students having high problem solving ability have more metacognition in comparison to the female students having low problem solving ability.

9. It was found that there is a significant difference between the mean scores of metacognition among male senior secondary students having high and low self-esteem. It may, therefore, be concluded that male students having high self-esteem have more metacognition in comparison to the male students having low self-esteem.

10. It was found that there is a significant difference between the mean score of metacognition among female senior secondary students having high and low self-esteem. It may, therefore, be concluded that female students having high self-esteem have more metacognition in comparison to the female students having low self-esteem.

11. It was found that there is a significant difference between the mean scores of metacognition among rural senior secondary students having high and low problem solving ability. It may, therefore, be concluded that rural senior secondary students having high problem solving ability have more metacognition in comparison to the rural senior secondary students having low problem solving ability.

12. It was found that there is a significant difference between the mean scores of metacognition among urban senior secondary students having high and low problem solving ability. It may, therefore, be concluded that urban senior secondary students having high problem solving ability have more metacognition in comparison to the urban senior secondary students having low problem solving ability.

13. It was found that there is a significant difference between the mean score of metacognition among rural senior secondary students having high and low self-esteem. It may, therefore, be concluded that rural students having high self-esteem have more metacognition in comparison to the rural students having low self-esteem.
14. It was found that there is a significant difference between the mean score of metacognition among urban senior secondary students having high and low self-esteem. It may, therefore, be concluded that urban students having high self-esteem have more metacognition in comparison to the urban students having low self-esteem.

CONCLUSION

Metacognition is an effective tool in learning process. Most conceptualizations of metacognition have in common that they take the perspective of "higher-order cognition about cognition." There is a higher order agent overlooking and governing the cognitive system, while simultaneously being part of it. This is the classical homunculus problem or Comte's paradox: One cannot split one's self in two, of whom one thinks whilst the other observes him thinking. The issue whether cognition and metacognition can be disentangled is not merely an academic one. In fact, metacognition draws on cognition. It is very hard to have adequate metacognitive knowledge of one's competencies in a domain without substantial (cognitive) domain-specific knowledge, such as knowledge about relevant concepts and theories in a domain, about intrinsic difficulties of a domain and about what is irrelevant. In terms of metacognitive skills, one cannot engage in planning without carrying out cognitive activities, such as generating problem-solving steps and sequencing those steps. Similarly, one cannot check one's outcome of a calculation without comparing the outcome with an estimation of it, or recalculating the outcome in another way. If metacognition is conceived as (knowledge of) a set of self instructions for regulating task performance, then cognition is the vehicle of those self-instructions. These cognitive activities in turn are subject to metacognition, for instance, to ongoing monitoring and evaluation processes. This circular process of metacognitive and cognitive activities makes it hard to disentangle them in the assessment of metacognition.

Occasionally, metacognition can be observed in students' verbalized self instructions, such as "this is difficult for me, let's do it step-by-step" or "wait, I don't know what this word means." Metacognition, however, is not always explicitly heard or seen during task performance. Instead, it has often to be inferred from certain
cognitive activities. For instance, doing things step-by-step may be indicative of planned behavior, although self-instructions for planning are not explicitly verbalized. Future research has to differentiate far more precisely between explicitly verbalized metacognitive knowledge and self-instructions, cognitive activities that are indicative of metacognition and purely cognitive activity.

In this study, metacognition was taken as dependent variable and problem solving ability and self-esteem were taken as independent. This study shows that problem solving ability and self-esteem has direct influence on metacognition on senior secondary students. It is found that the students who have high problem solving ability show greater metacognition. On the other side researcher conclude that the students who use greater thinking ability i.e. thinking beyond thinking and thinking about thinking in their study or routine life are more able to solve their problems. Whereas the students who have fewer problems solving ability are not able think beyond thinking and are not able to solve their problem with ease. It is also found that the students have high self-esteem shows high metacognition and the students having low self-esteem shows low metacognition. Finally, researcher concludes that if the problem solving ability and self-esteem of the students will be developed in the classroom while teaching-learning process then they may increase their metacognitive ability.

**DISCUSSION OF THE RESULTS**

The present study was conducted on adolescent students with respect to metacognition abilities in relation to their problem solving abilities and self-esteem. In the present, study metacognition and problem solving ability were studied as inter-related and there was found a positive correlation between metacognition and problem solving ability. This shows that as the scores of problem solving ability increases, the score of metacognition also increases. It means that the students who have high problem solving ability having high degree of metacognition in their life. The finding of the study revealed positive and significant relationship between metacognition and problem solving ability. It shows that there is positive significant relationship between metacognition and problem solving ability which shows that problem solving ability directly influences metacognition ability among senior secondary students. The
students having high problem solving ability have better metacognition and vice-versa. The studies of Lesh (1982), Silver (1982) and Schoenfeld (1982) regard metacognitive actions as the 'driving forces' in problem solving, influencing cognitive behaviour at all phases of problem solving. Some research studies have also reported success in making young children become more aware of their regulation during problem solving (Clements, 1990). Specifically, there is evidence that students trained in learning to monitor and control their own cognitive processes for solving problems do better than untrained students (Cardella-Elawar, 1992). A study was done in the year 2003 by Rajagopal Ponnusamy on the Impact of Metacognition and Problem Solving Strategies among Low-Achievers in History, investigates the impact of metacognitive strategies among lower achievers in secondary schools. Much has been said about the use of thinking strategies in the teaching of History. However, until now, little emphasis has been given to the use of metacognitive strategies in the teaching and learning of History. A teaching task accomplished in the classroom is not a signal that learning has taken place. If learners are to be afforded the opportunity to regulate their own learning, then a metacognitive theory of learning has to be developed in order to redefine the outcome of learning.

The findings of the study revealed significant difference among male and female students regarding metacognition abilities. It was found in the present study that the male students have high metacognition than the female students. But the study of Rani and Punita (2013) revealed that gender has no significant impact on the metacognition of undergraduate students, but the study of Sharei, Kazemi and Jafari (2012) represent meaningful difference between males and females in three variables; in fact, the performance of male students was better than females in metacognitive capabilities and problem solving.

In the present study, it was found that there is a significant difference between the mean metacognition scores of urban and rural senior secondary students. Urban students were found to have better metacognition as compared to rural students. It means that the boys are doing more thinking than the girls students. It means that the education or the learning environment of the students is more concentrating on thinking of the students who are learning in urban area schools. Our findings are in
consonance with the findings of Rani and Punita (2013) who also found significant difference in metacognition between rural and urban students. According to them urban students differs significantly from their rural counterparts. It seems that students need to be metacognitively aware of the need to use strategies, knowledgeable about strategies and motivated to use those strategies. Without such awareness, strategy instruction seems futile.

On the basis of result of present study, it was concluded that there exist a significant difference in metacognition abilities among students having high and low problem solving abilities. The students having high problem solving abilities were found better in metacognition as compared to the students having low problem solving abilities, which is in consonance with the study of Mayer and Wittrock (1996) who posit that the main idea in such thinking programmes is that with direct instruction in thinking skills (behaviours and thoughts), the problem solver is influenced in their representation of a problem and the planning and monitoring of problem solving solutions. Doomekamp (2001) stated that students’ metacognitive skills can be developed using tools that can effectively visualize the problem-solving process, such as concept maps. Kinchin and Hay (2005) mentioned that through drawing concept maps, students can organize, reorganize, and assimilate conceptual knowledge they learn, and their learning will become meaningful if new concepts are connected to existing ones.

The findings of the presented revealed that the students having high self-esteem having better metacognition abilities as compared to the students having low self-esteem. Although this is an underexplored area of research, there is evidence that teachers can have a positive or negative effect on motivation and self-esteem. They can influence both the goals that students set (learning or performance goals), as well as their commitment to those goals. Praising effort and strategic behaviours, and focusing students through feedback on learning goals, leads to higher metacognition abilities than praising ability or intelligence. The latter can result in a learned-helplessness orientation (Dweck, 1999). As Black and William (1998) note, feedback that draws attention away from the task and towards self-esteem can have a negative effect on attitudes and performance. In other words, it is important that
students understand that feedback is an evaluation, not of the person but of the performance in context. Self-esteem can be disengaged from what others opinion and is a general valuation about myself in different areas like identity, appearance, properties, my role among peers. Self-esteem is built through the experiences in life but also from our life events. Self-esteem is treated in several important theories about motivation and behaviour like self-efficacy, perceived competence and explanations about success and failure. The own ability improves through support and encouragement from the surrounding and gives the courage to try in life. Self-ability is a specific concept and has central importance in general own ability and confidence to your own ability to handle stressful situations (Bandura, 1997). The difference between self-esteem and self-ability could be described, as self-ability to be about the individual’s evaluation of the probability for a specific ability in a specific situation or within a specific area, will obtain a desired outcome. Self-esteem is a general evaluation about self-value (Lindwall, 2011). Due to Kaver (2009) is self-esteem as well as self-ability not a constant properties, it varies over time, in different contexts and between different situations. Self-perception is important for the individual’s social and cognitive development and several studies have shown that it is related to quality of life. While Kilinç (2013) found medium level of relationship between self-esteem and metacognitive awareness in upper secondary level students.

A study was done in the year 2008 by Shipra Nagar, Shubhangna Sharma and Goldy Chopra on Self Esteem among Rural Adolescent Girls in Kangra District of Himachal Pradesh, it is conducted with an aim to know the self-esteem of adolescent girls and the factors affecting in Kangra District of Himachal Pradesh. Results indicated that majority of the girls had average scores of self-esteem. Self-esteem scores were found to be positively correlated with the educational status of the girls. Here in this study, significant difference was found between the mean metacognition scores of rural and urban/male and female senior secondary students having high and low metacognition. Both the rural and urban senior secondary students have different kind of self-esteem. The mean metacognition score of male students is greater than the metacognition score of female students with high self-esteem. The mean self-esteem score of urban students is lesser than that of rural
students. It shows that the urban students have more self-esteem than rural students and also found a significant difference between the mean self-esteem scores of male and female senior secondary students. Both the male and female senior secondary students have different kind of self-esteem. The mean self-esteem score of male students is higher than that of female students. It shows that the male students have greater self-esteem than the female students. They give respect to their self. In the year 2011 a study was done by Thomas Anderson on Relationship of Self-efficacy, metacognition and performance have shown that the relationship between self-efficacy and performance is partially mediated by metacognition (e.g., Bouffard-Bouchard, Parent, & Larivee, 1991; Kanfer & Ackerman, 1989).

Bandura and Wood (1989) found self-efficacy influenced performance directly and indirectly through its effects on analytical strategies, suggesting a mediating effect of metacognition in the relationship between self-efficacy and performance. The implications of these findings drive the purpose of this study to investigate the relationships among self-efficacy, metacognition and performance. This study aimed to understand whether metacognition was a partial or complete mediator in the relationship between self-efficacy and performance. The hope is that the present research would contribute to the existing body of research on the relationship between learning variables of self-efficacy, metacognition and performance and would add to existing research showing the mediated effect of metacognition in the relationship between self-efficacy and performance. Strong correlations were expected among self-efficacy, metacognition and performance. Metacognition was expected to partially mediate the relationship between self-efficacy and performance as students with strong faith in their ability to successfully complete a task are likely to utilize metacognitive strategies to this end. Here in this study the relationship of problem solving ability with metacognition and self-esteem with metacognition were studied and it is found that there is positive and significant relationship between problem solving ability and metacognition & self-esteem and metacognition. Finally, in this study it can be said that there is positive and significant relationship between metacognition with problem solving ability and self-esteem. The metacognition score of high and low problem solving ability is found significant and
in respect to self-esteem it is again significant. The metacognition scores of male and female students having high and low problem solving ability is also found significant. The metacognition scores of rural and urban students having high and low problem solving ability was also found significant. Similarly, the metacognition scores of male and female students having high and low self-esteem were found significant. The metacognition scores of rural and urban students having high and low self-esteem is also found significant. With all these results it is clear that problem solving ability and self-esteem are directly related to the metacognition. Those students have high problem solving ability and self-esteem shows high metacognition and vice-versa.

Hence, it can be said that adolescence is a key stage in human development, incorporating physical, social, hormonal and psychological changes (Lerner & Steinberg, 2004). While a small number of studies have examined how awareness of others’ mental states (mentalising) develops during adolescence, little was known about how awareness of one’s own task performance (metacognition) changes with age in a paradigm in which performance and confidence can be dissociated. In the current study, we show that metacognitive ability improves with age over the course of adolescence. We suggest that a gradually improving ability to be aware of one’s own thoughts and behaviour during this period may confer particular benefits for development including the emergence of high level cognitive competencies.

EDUCATIONAL IMPLICATIONS OF THE STUDY

Students who apply productive metacognitive, problem solving ability and self-esteem skills show better learning when working with interactive learning environments. It will always be difficult, when researching literacy, to determine exactly which factors caused which outcomes and to gauge the extent of this impact – because the affective, cognitive and metacognitive components of the reading process are tangled in such a complex web. Nonetheless, future research could improve upon the design of the current study. Ultimately it was impossible to determine the impact of the various components of this intervention teaching, which included planned teaching about metacognition, incidental teaching of strategies and revision of previously taught strategies. The small groups the students practiced strategies in and the texts linked to the Inquiry topic were not chosen with this study as the first
priority, but rather were selected to try and simultaneously address other curriculum obligations. Such is the nature of a dynamic action research project that had to take place within the time and structural limitations of classroom and level teaching commitments and project submission dates.

The metacognitive thinking strategies in this study did prove that it had a significant predictability. The results of the study successfully demonstrated that successful problem solvers think in a structured manner and this study to certain degree was able to quantify this structure.

In our study, it was found that there is a significant relationship between metacognition & self-esteem and metacognition and problem solving ability of students in relation to their locality gender. Lecturers should prepare some sort of checklist for the students at the beginning of the lesson. Students should be monitored and rewarded for organizing their thoughts in congruence with this checklist. This checklist should include components of the metacognitive thinking strategies that have been discussed above. This researcher is certain if this is done at an early stage and repeatedly until their execution becomes a natural behavior.

The intervention period of the current study was also too short to allow for independent mastery of the metacognitive strategies taught. Future studies investigating the impact of self-esteem and problem solving ability on metacognition would benefit from a longer implementation period. This would increase opportunities to personalise scaffolding; to incorporate elements of cross-age peer tutoring that would allow at-risk readers to experience a heightened sense of accomplishment; and to increase the likelihood of students developing automaticity of skills and strategies.

Future research is warranted because the students’ level of engagement was heartening and within the short timeframe of the intervention, they demonstrated their growing awareness of the importance of constructive self-talk to both efficacy and achievement. In addition, both the researcher’s observations of the at-risk students’ and the improvements in their pre and post scores hold promise for future studies. The task ahead for researchers is to improve the study design and methods of data
collection, to ensure that the learners’ journeys can be closely monitored and accounted for.

In our study, it was found that that students having high self-esteem and high problem solving ability were found better in metacognition. Teachers should take heed of this discovery. Students should be psychologically prepared particularly at the younger age, to escalate their self-esteem and problem solving ability to enhance their metacognition.

This study was able to demonstrate that self-esteem and problem solving ability is one of the predominant factors in the students’ metacognition. Teachers and lecturers should be encouraged to allocate significant amount of their time to promote the desire for acquiring their subject matter. This will tantalize the students’ interest and at the same time motivate the students to acquire these information and skills voluntarily.

Overall this study will help the teachers to design the teaching methodology on the basis of problem solving ability and self-esteem for the students. It will also help in developing ones own awareness of their learning. Higher-order thinking skills are what teachers are striving for in the classroom, so this study will help in the development of HOTS among students. It will help in monitoring and regulation of cognitive processes. Low achieving students can improve their learning skills with metacognitive skills. This way the teacher will have a deeper understanding of the type of metacognitive skill that will fit the student’s learning style. Individuals can learn how to better regulate their cognitive activities. Those with greater metacognitive abilities tend to be more successful in their cognitive endeavors. Self-esteem is critical for individuals to think about and be able to take advantage of strengths and for learning from mistakes (metacognition). As teachers we can be instrumental in creating a classroom environment which nurtures and supports students developing self-esteem. This can be achieved by modeling to students that mistakes are part of the learning process for students. It is important to empower and skill students to assess their achievements in a positive productive manner. This creates autonomous learners. Students need to be encouraged to develop support
systems both within and outside of the classroom so that they feel confident to take risks in their learning. This research will help to maximize the use of problem solving approach for developing metacognition among students.

SUGGESTIONS FOR FURTHER STUDIES

• This study can be applied on a large sample of senior secondary students of government and private schools students.
• This study can be applied on a large sample of disabled students of rural and urban schools students.
• This study can be applied on a large sample of disabled students of government and private schools students.
• Research can be conducted to study the effect of EQ or IQ on Metacognition level among secondary school students.
• Correlation between Metacognition & Academic achievement with respect to general intelligence can be explored.
• Correlation between Metacognition & Performance with respect to specific intelligence among college students can be studied.
• Correlation between Stress & Adjustment with respect to Metacognition among college going students can be examined.
• Effect of Metacognition on the personality traits among graduate and undergraduate students can be explored.
• Relationship between self-concept, self-esteem, mind-map and metacognition among urban and rural students can be examined.
• Correlation between self-esteem and attitudes with metacognition can be examined.
• Relationship between cognition and metacognition in respect of metacognition among school going students can be explored.
• Significant difference between XII grade students & the undergraduate student’s with respect to metacognition and problem solving ability can also be seen.
• The study can also be done on the same topic on graduate and Post graduate students on different universities.
• Nature of human behavior with relation to studying styles can be effectively studied.
• The study can be done to know the relevance of brainstorming and brain sketching with leadership trait in their professions choices.
• The study can be done to examine the effectiveness of social quotient in the modification of Self-esteem and professional ethics.
• The study of brainstorming in relation to metacognition and problem solving ability of the students can be explored.

DELIMITATIONS OF THE STUDY

1. The present study is confined to Senior Secondary students of class twelfth.
2. The sample is restricted to 320 students.
3. The age group of the sample is restricted to 16-20 years.
4. The present study is confined to ten urban and ten rural area schools.
5. The present study is confined to Jhajjar district school only.