REVIEW OF RELATED LITERATURE

A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. A literature review usually precedes a research proposal and results section. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal such as future research that may be needed in the area.

According to Cooper (1988), “a literature review uses as its database, reports of primary or original scholarship, and does not report new primary scholarship itself. The primary reports used in the literature may be verbal, but in the vast majority of cases reports are written documents. The types of scholarship may be empirical, theoretical, critical/analytic, or methodological in nature. Second a literature review seeks to describe, summarise, evaluate, clarify and integrate the content of primary reports”.

The review of literature becomes a link between the research proposed and the studies already done. It tells the reader about aspects that have been already established or concluded by other authors, and also give a chance to the reader to appreciate the evidence that has already been collected by previous research, and thus projects the current research work in the proper perspective.

This step helps to eliminate the duplication of what has already been done in the relevant area. Review of literature is also important to highlight difference in opinions, contradictory findings or evidence and the different explanations given for their conclusions. In short review of literature is a very important aspect of any research both for planning work as well as to shows its relevance and significance.

For the present study, a detailed literature survey in relation to Metacognition, Multimedia and other related variables like self efficacy, scientific creativity, social skills and academic anxiety have
been carried out. The studies reviewed are presented under the following heads:

3.1 Studies Related to Metacognition.
3.2 Studies Related to Multimedia.
3.3 Studies Related to Other Related Variables
   3.3.1 Studies Related to Self Efficacy
   3.3.2 Studies Related to Scientific Creativity
   3.3.3 Studies Related to Social Skills
   3.3.4 Studies Related to Academic Anxiety

3.1 Studies Related to Metacognition.

Zohar & David (2010) made a study on the contribution of meta-strategies in scientific inquiry learning. The findings showed that explicit teaching of Metacognitive Strategies had a stronger effect for low-achieving students than for high-achieving students.

Karpicke (2010) conducted a study on Metacognitive strategies in student learning. The study has revealed that practicing retrieval of information (by testing the information) has powerful effects on learning and long-term retention. Repeated testing enhances learning more than repeated reading, which often confers limited benefit beyond that gained from the initial reading of the material. The study also showed that students lack metacognitive awareness of the mnemonic benefits of testing. The implication is that in real-world educational settings students may not engage in retrieval practice to enhance learning.

Topcu (2010) investigated the relationship among elementary school students’ epistemological beliefs, metacognition, and constructivist science learning environment. Constructivist learning environment survey (CLES), junior metacognitive awareness inventory (Jr. MAI), and Schommer epistemological belief questionnaire (EB) were administered to students. Factor Analysis of Jr. MAI revealed that both knowledge of cognition and regulation of cognition items were loaded into one factor. Regression analyses revealed that
metacognition and omniscient authority were significant predictors of personal relevance dimension of CLES. Metacognition was found as the only predictor of the student negotiation. Innate ability and metacognition significantly contributed to uncertainty.

Whitebread & Coltman (2010) conducted a study on aspects of pedagogy supporting metacognition and self-regulation in mathematical learning of young children. The children were engaged in mathematical activities designed by practitioners to facilitate metacognitive processes. Metacognitive ‘events’ were identified and the children’s behaviour was analysed for indications of metacognitive thinking. At the same time, the pedagogical context of the activities, including interventions by adult practitioners, was analysed in relation to the metacognitive opportunities afforded. Findings were that, the young children did indeed show evidence through their talk, and their non-verbal actions, of emergent metacognitive processes, and that the nature and frequency of these processes were influenced by pedagogical aspects of the mathematical activities.

Zabruckya (2010) conducted a study on metacognition in Taiwan: students' calibration of comprehension and performance. In this study researcher has increasingly investigated the role played by metacognition in students’ learning and performance. Metacognition is comprised of metacognitive knowledge and metacognitive experiences, and both components of metacognition are viewed as being important to learning and performance in academic settings. Metacognitive experiences involve students’ awareness of progress on cognitive tasks. Such awareness is critical to learning, for students may fail to spend additional time reviewing or studying material if they believe they have understood the material adequately. Students were able to predict comprehension and test performance at better than chance levels and were more accurate at postdiction than prediction.

Choube (2009) conducted a study to find out the effectiveness of constructivist approach on problem solving and metacognitive skills of students in science at secondary level. The aim was to strengthen the
metacognitive and reflective skills of students to assist them in adopting the strategies and reflective processes that enabled them to define, plan and self-monitor their thinking during problem solving. The result showed that constructivist approach has positive effect on the development of metacognitive skills of students in science. It is proposed that metacognitive skills can be fostered by developing learners’ awareness of the problem solving approaches of experts, offering modeling and training in problem solving strategies and employing pedagogies that enable learners to monitor and self-correct their own problem solving approaches.

Ediger (2009) in his article “Metacognition strategies in the social studies” illustrates how to apply metacognitive strategies in the teaching learning of social studies. According to him, while teaching social studies lesson, learners will provide opportunities for reflection. Reflection involves metacognition that is thinking about thinking. Whatever the student has acquired and learned, adequate time must be given to think and view a new and in a creative manner about that which is vital.

Filho (2009) made a study on confidence judgments in real classroom settings: Monitoring performance in different types of tests. During testing, students have a valuable opportunity to exercise and improve their self-regulatory skills. The results showed that high-metacognitive students presented more effective test preparation practices, better test performances, and superior attributional, regulatory, and monitoring processes than their counterparts.

Huff & Nietfeld (2009) found out that strategy instruction and confidence judgments improve metacognitive monitoring. Current models of self-regulated learning emphasized the pervasive need for metacognitive monitoring skills at all phases of the learning process. Findings revealed that students in both treatment classes improved their calibration accuracy and showed higher confidence on test performance than students in two comparison classes after two weeks of instruction. However, students in the monitoring accuracy training
class also showed significant gains in overconfidence in comparison to those in the other three classes. Implications for integrating comprehension-monitoring training at the elementary school level are discussed.

Ibabe & Jauregizar (2009) made a study on online self-assessment with feedback and metacognitive knowledge. Its aim was to determine the relationship between students’ frequency of use of online self-assessment with feedback and their final performance on the course, taking into account both learners’ motivation and perceived usefulness of these resources for their learning process. The results showed relationship between metacognitive variables and students’ effort and their performance. The need to include self-assessment in the curriculum, with a view to improve students’ metacognitive knowledge was also addressed.

Leutwyler (2009) conducted a study on differential development patterns of metacognitive learning strategies in high school. The main objective of this study is to identify the development of students’ self-reported use of metacognitive learning strategies during high school. The results suggested that, from a global perspective, there is no development of students’ self-reported use of metacognitive learning strategies during high school.

Moos & Azevedo (2009) investigated about self-efficacy and to what extent does monitoring mediate its relationship with hypermedia learning. Results indicated that the relationship between self-efficacy and specific monitoring processes (monitoring understanding, monitoring environment, and monitoring progress towards goals) was significantly detectable. Regression analysis revealed that the relationship between self-efficacy and hypermedia learning outcomes was mediated by the extent to which participants monitored their understanding and the environment.

Peters & Kisantas (2009) conducted a study on self-regulation of student epistemic thinking in science: the role of metacognitive prompts. The Purpose of the present study is to examine the
effectiveness of a metacognitive prompts intervention-science (MPI-S), which is based on the nature of science with 162 eighth-grade science students. Findings showed significant improvements in students’ content knowledge and nature of science.

Anderson et al (2008) investigated the effect of metaconceptual teaching practices on students’ understanding of force and motion concepts. The results showed that students in the experimental group had significantly better conceptual understanding than their counterparts in the comparison group and this positive impact remained after a period of nine weeks.

Begum & Balasubramanian (2008) made a study on metacognitive awareness among the medical college students of Tamilnadu. The study measured the level of metacognition among the Medical College Students of Thanjavur and Salem Districts of Tamil Nadu. The level of metacognitive awareness is highly correlated with the academic performance of the students. The results indicated that the level of metacognition among the medical college students is somewhat less. The study reflected the need for metacognitive training, counselling and teaching self-regulatory strategies for the successful achievement of intellectual tasks.

Lajoie (2008) through his study on metacognition, self regulation and self-regulated learning explained the distinctions researchers made in defining metacognition, self-regulation, and self-regulated learning along with the methods used to explore these constructs. The interaction between the mind and environment continues to be an interesting question with regard to these three constructs, and this interaction can be explored by using computers as cognitive tools. The study revealed that technology-rich environments provide opportunities for learners in assessing and validating metacognition, self-regulation, and self-regulated learning.

Young & Fry (2008) studied the relationship between metacognitive awareness and academic achievement among college students. Correlations were found between
Metacognitive Awareness and cumulative GPA as well as end of course grades. Scores on the Metacognitive Awareness Inventory significantly differ between graduate and undergraduate students.

Zohar & David (2008) conducted a study on explicit teaching of meta-strategic knowledge in authentic classroom situations. The present study focuses on the control of thinking strategy. The findings showed dramatic developments in students’ strategic and meta-strategic thinking following instruction. Findings showed that explicit teaching of metacognitive strategic knowledge had a strong effect on low achieving students.

Anderson & Nash (2007) investigated that 11th and 12th standard physics students metacognition influences the development of their conceptual understandings of kinematics. The metacognitive character of individual learners was demonstrated to have a strong influence on their conceptual development.

Conner (2007) studied the degree of awareness and use of specific metacognitive strategies by 16 students in a final year high school biology class. The aim of the intervention were to broaden students thinking about bioethical issues associated with cancer and to enhance students use of metacognition. Cues and prompts were used in this units of work to help students use of metacognitive strategies since students did not generally use metacognitive strategies spontaneously. It was found that those students who were not only aware of but also used strategies to plan, monitor and evaluate their work produced essays of high quality.

Karia (2007) conducted a study on metacognition and self regulated learning. The study found that those with better self-regulation skills typically learn more with less effort and reported higher levels of academic satisfaction. The results implied that metacognition improves the self regulated learning outcomes of students.

Karia (2007) reviewed different aspects related to metacognition. Metacognition are often described in terms of its components,
knowledge of cognition and regulation of cognition. Knowledge of cognition includes knowledge of self, knowledge of tasks and the extent to which strategies can be used effectively, and strategic knowledge or knowledge of contexts, such as when to employ specific strategies. Regulation of cognition involves planning for the task, selecting strategies, monitoring and evaluating progress and debugging or strategy correction. It is suggested that successful learning requires an understanding of context and the ability to use the right strategy at the right time.

Saravanakumar & Mohan (2007) made an experimental study on enhancing student’s achievement in science through metacognitive orientation. This study aims to develop appropriate strategies to enhance the level of metacognitive orientation towards enhancing student’s achievement in science. Gradual increase in the dependent variable viz., student’s achievement in science from initial assessment to final assessment indicates the positive influence of the independent variable namely, metacognitive orientation.

Sangur (2007) made a study on the contribution of motivational beliefs and metacognition of students performance under consequential and non consequential test condition. It consisted of two components of metacognition, knowledge of cognition and regulation of cognition. Regression analysis showed that the regulation of cognition component of metacognition and mastery goal orientation were the best predictors of students achievements under consequential test conditions. Under non consequential test conditions regulation of cognition lost its predictive power and mastery goal orientation and task value.

Georghiades (2004) studied on notion of metacognition, which is usually defined as cognition about cognition. It highlighted on the positive impact of metacognition on learning. It also relates metacognition to the broader area of general thinking skills and discusses the appropriatenessness of practicing metacognition with
primary school students. It proposed direction for research in science education with an interest in metacognition.

Higgins (2000) conducted a study on the impact of using integrated metacognitive instruction in high school students’ achievement, self efficacy and text anxiety. The treatment group had higher scores on achievement test, higher self-efficacy scores, and lower test anxiety scores. Significant relationship was found between gender and achievement, metacognitive self-regulation and test anxiety.

Maule (2000) developed and implemented a prototype WWW-based instructional learning system modeled around a metacognitive research and development framework which mapped cognitive variables, metacognitive learning strategies for those variables to delineate learning strategies and related metacognitive attributes of young students acquiring knowledge in advanced science concepts in an internet / browser – based environment. The framework also provided a basis for learner specific internet content personalization.

Rickey & Stacy (2000) in their paper “The role of metacognition in learning chemistry” discussed metacognition and its role in conceptual change and problem solving in chemistry. They argued that promoting metacognition in the science classroom prompts students to refine their ideas about scientific concepts and improves their problem solving success.

Cattell (1999) examined the effects of strategically teaching metacognitive skills to high, medium and low achieving fourth grade students and how it influenced their ability to comprehend grade level tests. Results indicated that strategic teaching of metacognitive skills influenced students’ ability to comprehend grade level tests.

Fisher (1998) in his article explored what metacognition is, why it is important and how it develops in children. It is argued that teachers need to help children in developing their metacognitive
awareness and should identify the factors which enhance their metacognitive development. Metacognitive thinking is a key element in the transfer of learning. The child's development of metacognitive skills is defined as meta-learning. Meta-teaching strategies can help to mediate the metacognitive skills of children, help to stimulate children's metacognitive thinking.

Gordon (1996) in his paper, 'Tracks for learning: Metacognition and learning technologies', outlines an investigation into the nature of metacognition and its relation to the learning process in a constructivist interactive multimedia learning environment. Within the interactive multimedia program the metacognitive support template is unique in that it aids students in their thinking, information processing and monitoring of their own learning process. In addition it facilities an environment where learners interpret their own views of reality by understanding how they arrived at these interpretations and views. It provides a support in the form of new schemata in the process of accommodating mental modes.

Charmello (1993) studied the effect of a metacognitive strategy - self questioning on the improvement of reading comprehension. It indicated that the self–questioning practice strategy had made a positive but not a significant difference in improving reading comprehension.

Piper (1992) conducted a study on increasing reading comprehension levels of average ability students. Five metacognitive strategies were employed to improve understanding of the adopted text book. It was concluded that instruction in the five metacongitive strategies improved the target groups reading comprehension abilities.

Williamson (1991) examined theories on metacognition and instructional strategies for developing metacognitive process. His conclusions were as follows. Children at age 11 have varying metacognitive abilities. Children lacking both interest in school and ability to concentrate on their school work do not appear to
access metacognitive processes for academic work. Teachers need to set clear expectations and teach social interactions that fosters metacognitive development. Theories of metacognition can be integrated into existing teaching strategies.

Lee (1990) investigated whether first grade students could be taught metacognitive strategies to solve analogies. Results indicated that students in the experimental group was good in finding the special relationships involved in the analogy as well as in utilizing a common language to help in its solution. Results also indicated an increased use of metacognitive strategies by students in the experimental group.

3.2 Studies Related to Multimedia.

Anboucarassy (2010) was undertaken a study to find out the Effectiveness of Multimedia in teaching Biological science to IX standard students. The study revealed that there was a significant difference in the achievement of the experimental group and control group. The multimedia helped the students in experimental group to sustain their interest and also their retention power compared to the traditional method of teaching.

Kumar & Habtemariam (2010) in their study, “Learning with multimedia: A constructive cooperative approach in education”, concluded that most of the multimedia programs for educational purpose create situations in such a way that the students can interpret information for their own understanding.

Reddy et al (2009) found out the effectiveness of Multimedia based modular instruction on the achievement in science of the problem students. Two matched groups of problem students were constituted for the experiment. The control group problem students were given routine treatment during the school hours. The experimental group problem students were subjected to Multimedia based modular instructional strategy for a period of three months. The obtained results established the effectiveness of Multimedia based
modular instruction on the achievement in science of the problem students.

Mohanty (2008) in his article “Multimedia approach to learning” stated that a variety of resources, starting from the traditional media to the Internet, are now accessible, the teachers have to use their imagination, ingenuity and initiative if this storehouse of multimedia is to be taken advantage of in the teaching–learning process.

Nimavathi & Gnanadevan (2008) developed a multimedia programme for the teaching of science, and experimenting the same with a set of children studying in the ninth standard and found out its effectiveness over the conventional method of teaching. The results showed that the multimedia programme prepared by the researcher was more effective for the achievement in science of ninth standard students.

Susan (2008) in her paper “Multimedia packages: Relevance for effective evaluation” explained the importance of multimedia packages in the present scenario, role of teacher in multimedia approach and how to evaluate a multimedia package. She also explained that the multimedia package should be evaluated in terms of the presentation of its content, learning experiences given, language used, computer potentialities etc. A structure of multimedia evaluation proforma was also presented in her paper.

Benjamin & Sivakumar (2007) in their article “Multimedia enhances effective self–learning” emphasized the need and importance of learning through multimedia CD-based self learning, and dwells on the quality as well as quantity of teaching and learning bringing forth the need and significance of learning science through self–learning with the help of multimedia CD-based courseware.

Anshu (2006) made a study on the Comparative effectiveness of single medium and Multimedia on learning gains of 9th grades in chemistry at different levels of academic achievement and intelligence. The study revealed that Multimedia is as effective as traditional
method of teaching in chemistry to develop the knowledge and understanding domain of the students, all kinds of students, i.e. having different and varied abilities.

Sangeeta (2005) in her study on the role of multimedia and co-operative learning in enhancing the writing competence of students, found out the impact of multimedia and co-operative learning on the writing competence of high school students and compared their relative efficiency on writing competence of students. The results indicated that, there exists a significant difference in the mean scores of students who were taught using multimedia. Hence, use of multimedia has been found to be quite effective in improving the writing composition ability of the students.

Anbuchelvan & Solayan (2005) found out the effect of using Audio-Visual Equipments on reading – writing communication among the students of standard V. The major findings of the study were. 1) The experimental students obtained significantly higher scores on the performance of reading and writing communication than the control group students. 2) The gain score of the experimental group was higher than the gain score recorded by the control group.

Ranade (2004) found out the effectiveness and critical evaluation of a computer Assisted Instructional Package developed for teacher educators. The major findings were- since information on Multiple Intelligence is not readily available in book, the content of the presentation was very useful and those teachers who have almost totally computer illiterate, felt motivated to learn computers after seeing their usefulness in teaching – learning.

Taj (2004) made a study on enhancing the performance and self confidence of slow – learners through activities and use of Multimedia package. The subjects were exposed to the experimental programme which consisted of audios ( 3 audio lessons, 3 nature songs, 1 role – play and 1 drama ), films ( 4 films shows depicting various aspects of nature), Visuals ( transparencies, photos, graphs, news paper cuttings etc. ) and computer assisted instruction ( colourful studies, matching
games, finding the hidden word, etc.). In addition the researcher employed activity method also. The major findings were, 1) In the Pre-test phase the experimental and the control group differed significantly in their self – confidence and performance in environmental science. 2) In the post – test phase there was no significant difference between the two groups with respect to self – confidence and performance in environmental science indicating that the slow learners had come on par with the normal students. 3) The slow learners improved significantly both in terms of their achievement and self confidence following the experimental programme proving its effectiveness.

Prathibha (2002) experimented the effect of Multimedia Approach in the teaching of standard four. The findings of the study proved significant effect of multimedia approach over conventional method of teaching.

Rajaswaminathan (1998) conducted a study on the impact of multimedia package in the teaching of commerce. The study found that the use of Multimedia Package was more effective than conventional method of teaching.

Agarwal & Mohanty (1998) undertook a metastudy to see the effectiveness of multimedia (MM), programmed learning method (PLM) and traditional method (TM) and found that students performance taught by MM and PLM were significantly higher than those taught by TM. Further, it was found that PLM and MM were more effective for secondary level than primary level, and found that PLM and MM was more effective for science subjects than arts subjects.

Kumar (1998) made an experimental study of the relative effectiveness of three methods of instruction – exposition method, programmed learning method and multimedia method in science education. Findings of the investigation were: (i) The multimedia method was more effective than either the programmed learning method or expository method. (ii) Retention in learning by the multimedia method was higher than by the other two methods.
Weinraub (1998) while studying student learning and perceptions on multimedia teaching presentation found that student perceptions and attention spans during lectures were significantly improved when the multimedia presentations was utilized. The study also found that multimedia presentations have a positive effect on student’s perceptions of the instructor’s ability to teach. Correlating these positive perceptions, with academic achievement, weinraub found a significant improvement for students who learned the material with the aid of multimedia. These findings seem to support the use of multimedia technology as a viable educational tool.

Cohen & Holzman (1997) studied the teaching and learning advantages of Multimedia and computer projects. The results of their study showed that both teachers and students found using the computer software complicated and confusing, although both groups had received previous computer training. Other technical mishaps occurred throughout the study, such as deleting files and introducing viruses into the system distressed the students and hindered their motivation to explore.

Kaswakar (1996) prepared and tested the effectiveness of multimedia package to develop population awareness. She found that the package was significantly effective in comparison to actual method, and developed awareness to a significant degree. Multi – media package was more effective in changing the attitude of teacher trainees.

Peterson & Orde (1995) made a study on implementing Multimedia in the middle school curriculum: Pros, cons and Lessons learned. The results of the study confirmed that initial use of computer – based materials made students insecure with the instructional method and the technology. As a result of this insecurity with regard to the multimedia, many students made little initial progress on their assignments and only after one–one instruction and further encouragement did the students begin to show signs of progress. They found that students were often bored with
materials that was to slowly paced, too text oriented, or written above or below the student’s intellectual and/or maturity levels. However, students working with hands-on interaction with sound files, clip art and anger to share their new discoveries with others. Although one of the main objectives for using multimedia in the classroom is for student motivation, there are some problems with using such visually descriptive and versatile forms of teaching methods.

Singh (1995) developed a study material relating to video instructional awareness. It was field tested and used in the schools in Gujarat, UP and Rajasthan and was found to be very effective and interesting. The study also reported that student enjoyed working through video package.

Preston (1994) in his paper outlined some of the issues involved in the use of multimedia authoring packages as a learning tool in the classroom. The paper suggested that “multimedia engines” such as Hyper Card and link way can be effectively used to enhance the problem solving skills and involvement of students across a wide range of curriculum areas.

Greenberg (1984) made a study on the effectiveness of a multimedia functional reading module. The use of the video cassette lesson with computer practice was compared to videocassette use with paper and pencil practice. The module focused on the functional reading skills. There were significant scores favoring the computer treatment in response to a question about enjoyment of the follow-up practice.

Krishnan (1983) conducted a study to find the effectiveness of the Multimedia package in terms of achievement of instructor trainees and the feasibility of the multimedia package in terms of time and cost for the instructor training programme. The instructional strategy was prepared in modular form. He concluded that the Multimedia package in modular form could be used for training programmes in vocational institutions.
Ravindranath (1982) developed a Multimedia Instructional strategy for teaching science (Biology) at secondary level. The multimedia strategy arrived at, comprised of twelve instructional components namely introduction by the teacher, programmed learning Material (PLM), lecture, team teaching inquiring technique, pupil activities with teacher demonstrations, discussions, audio-visual presentation, summary, criterion test and feedback exercises and augments. The main findings of the investigation were as follows. 1) The instructional strategy was effective to the extent that 70% of the experimental group students obtained 60% and above on all the unit tests and the comprehensive test. 2) The experimental group students performed better than the control group on the comprehensive test and also on the annual examination conducted by the school authorities.

Vardhini (1982) made a study on the Development of a Multimedia Instructional Strategy for teaching science of students at secondary level. The major finding of the study was visual projections with teacher explanation and those with taped commentary were equally effective in terms of achievement. The educational implication of the study was that for achievement of different instructional objectives, a systematically validated multimedia strategy can be implemented at school level with suitable cost and time components.

Basu (1981) in his study of the effectiveness of multimedia programmed materials in the teaching of physics tried to make an appraisal of the relative effectiveness of multimedia programmed instruction and programmed class teaching on the criteria of immediate achievement and retention of a group of subjects at 3 levels of ability. He found that there was a significant difference among the different strategy means on the criterion on overall achievement. The strategies of multimedia programmed instruction enabled learners to reach the level of mastery learning. It was found that a significant difference existed in the achievement through the different strategies due to difference in ability.
Shah (1979) developed and tried out a multimedia package for effective questioning in the context of micro teaching. The experiment was conducted by using single group design. The major findings of the study were.1) The teachers who were exposed to the treatment of the multimedia package showed significant improvement in all the skills except one.2) The results obtained on the package course evaluation questionnaire indicated that the package course was quite interesting for the participants.3) The qualitative evaluation of the package led to the conclusion that the teachers were quite satisfied with the package course so far as its educational importance was concerned.

Poornam (1968) experimentally studied the effectiveness of multimedia approach for teaching secondary school pupils. The study showed that multimedia approach is found to be effective in improving competency of students. This approach seemed to benefit both high and low achievers and it tends to increase the interest of learners. The rate of achievement also seemed to be higher than that of teaching using traditional methods.

3.3 Studies Related to Other Related Variables

In this section, the investigator included various studies of related variables like self efficacy, scientific creativity, social skills and academic anxiety under the following subheads;

- 3.3.1 Studies Related to Self Efficacy
- 3.3.2 Studies Related to Scientific Creativity
- 3.3.3 Studies Related to Social Skills
- 3.3.4 Studies Related to Academic Anxiety

3.3.1 Studies Related to Self Efficacy

Wood & Locke (2010) made a study on the relationship between self efficacy and grade goals to academic performance in college courses. Results showed that self efficacy was found to be significantly related to academic performance.
Ruchan (2010) studied the correlation between self efficacy beliefs and academic achievement. The results revealed that there was weak relationship between self efficacy perception and academic achievement.

Elias (2010) studied achievement motivation and self efficacy in relation to adjustment among University students. The results showed that the three variables namely adjustment, achievement motivation and self efficacy were found to be correlated positively with one another.

Adeoye & Emeke (2009) studied the relative effect of emotional intelligence and self-efficacy training on the scholastic achievement of some Nigerian secondary school students. The result showed that self efficacy enhances the achievement of students.

Salami and Ogundokun (2009) made a study on emotional intelligence and academic self-efficacy as predictors of academic performance among senior secondary school students in Oyo State, Nigeria. The findings indicated that emotional intelligence and academic self-efficacy were potent predictors of academic performance of students.

Hemmings & Kay (2009) investigated factors which relate to lecturers self efficacy. Results revealed that significant multivariate differences were found for gender, level of qualifications and their interactions on the set of the self efficacy factors.

Adeyemo (2008) studied the influence of emotional intelligence, gender and age on the academic self efficacy of distance learners. The result showed that emotional intelligence, gender and age were vital factors in enhancing academic self efficacy of distance learners.

Raj (2004) studied the relation of self efficacy with behavioral problems and school performance of children. The result showed that negative relationship was found between self efficacy and behavioral problems and significant positive relationship was found between self efficacy and the school performance of children.
Pintrich & Linnerbrink (2003) studied about the role of self efficacy belief in student engagement and learning. They reported that self efficacy plays an important role in student’s engagement in classroom. Students who have positive and relatively high self efficacy beliefs will be more likely to be engaged in the classroom in terms of their behaviour, cognition, and motivation. Student self efficacy is inherently changeable and sensitive to contextual features of the classroom.

Schunk (2003) found that self efficacy and achievement can be enhanced through instructional methods that incorporated modeled strategies, progress feedback, goal setting and self evaluation of progress to the extent that these and other efficacy enhancing methods are employed in classrooms, teachers will foster academic achievement and motivation for continued learning among all learners.

Joo et al (2000) conducted a study on the effect of student motivation on performance in Web Based Instruction (WBI). Path analysis revealed that student self efficacy for self regulated learning positively related to their academic self efficacy strategy use and internet self efficacy. Academic self efficacy predicated student’s performance on the written test, which comprised problems on topics during the previous WBI session.

Pajares (1996) tested the self efficacy beliefs in the mathematical problem solving of middle school gifted students and regular educational students in algebra classes. The results showed that gifted have higher math’s self efficacy and self efficacy for self regulated learning as well as lower math’s anxiety than regular education students. Although most students were over confident about their capabilities, gifted students had more accurate self perceptions.

Schunk (1991) in his study on self efficacy and academic motivation provided evidence that there are students who know the material and have the requisite skills but are not confident that they
can use their knowledge or enact their skills. Such students will be less likely to exert efforts and more likely to give up quickly rather than persist at the task.

3.3.2 Studies Related to Scientific Creativity

Jang (2009) made a study on “Exploration of Secondary Students Creativity by Integrating Web-based Technology into an Innovative Science Curriculum”. The purpose of the study was to investigate how web-based technology could be utilized and integrated with real-life scientific materials to stimulate the creativity of secondary school students. Several real-life experience science sessions integrated with online teaching were used for one semester. The study used an interpretive methodology, which was qualitative analysis rather than quantitative analysis. The results showed that the study provided information to enhance students’ expression of sensitivity, fluency, flexibility, originality, and elaboration of scientific creativities. Students’ creativity was motivated by the online interactivities and the teacher’s inquiry.

Jaiswal (2007) conducted a study on scientific creativity and achievement motivation of grade X students of different Educational Boards of Kanpur city. The results of the study showed that achievement motivation has significant impact on scientific creativity of grade X students irrespective of their Boards. It is also obvious that highly motivated students have high creativity in comparison to low motive students.

Aktamiş & Ergin (2005) conducted a study on “The effect of scientific process skills education on students’ scientific creativity, science attitudes and academic achievements”. The study provided some techniques for improving scientific process skills (SPS) and scientific creativity. The study revealed that science teachers can consider scientific creativity as an educable skill rather than an extra-ordinary skill.
Yadav & Hussain (2004) in their research work, An interactional study of scientific creativity and some of its related factors reached the following conclusions -1) Only personality topology seems to have main effect on scientific creativity, 2) Variables like locale and sex do not have any significant effect on scientific creativity, 3) The interactional effect of all the three variables -personality topology locale and sex is considerably significant.

Patel (2002) made a study on the Scientific Creativity of undergraduate science students of Allahabad University and Affiliated Degree Colleges. The major findings of the study were –1) There was no significant difference among students of university teaching departments and affiliated degree colleges with respect to their overall scientific creativity and different aspects of scientific creativity i.e., fluency, flexibility, originality and inquisitiveness. 2) There was no significant difference in overall scientific creativity as well as fluency, flexibility, originality and inquisitiveness aspect of scientific creativity among boys and girls. 3) Girls excelled boys in fluency and flexibility and aspect of scientific creativity.

Imran (2002) made a comparative study of Scientific Creativity in the pupils of VIII standard of different media schools of Aurangabad. Verbal test of scientific creativity constructed by V.P. Sharma and J.P. Shukla was used for the study. The Major Findings were. 1) The students learning in English medium schools situated in posh locality were found superior on scientific creativity than the students learning in Marathi medium and Urdu medium schools situated in posh as well as slum areas. 2) The students of Marathi medium schools situated in posh locality were found superior in scientific creativity than the students of Urdu medium schools situated in posh locality as well as slum areas.

Gujarathi (1992) conducted a study named preparation of an integrated programme of training in scientific creativity and experimental study of its effects on students of Grade X . The study reported that; after the treatment, experimental group showed
improvement in scientific creativity and the test prepared by the investigator was found reliable and valid.

Datta (1989) tried to find out the difference in scientific creativity among high school students and reported that sex difference did exist in scientific creativity. Scientific creativity depends on intelligence, academic achievement, and socio economic status. Dominant factors, of scientific creativity were fluency, flexibility and originality in case of both boys and girls.

### 3.3.3 Studies Related to Social Skills

Fuller (2009) conducted a study on activating children’s thinking skills through social skill training programmes. The result revealed that social skill training programmes are very effective in developing critical thinking skills.

Preece & David (2009) through his study found that social skills training program improve the social skills of children with Discipline Behavioral Disorder.

Colleen (2008) through his study found that the social skill of elementary school students increased by the use of literature and role playing method.

Naomi (2008) made a study on incorporating social skills training into daily academic instruction to motivate the social interpersonal relationship of the students and revealed that the training program improves the qualities for interpersonal relationship.

Watson (2006) reported that children who are lacking social skills are especially anxious and are overly cautious, which lead them to avoid social situation.

Quinn (1999) found that many children with Emotional or Behavioural disorders display social skills deficits that can add to their difficulties in school.

Benojith (1998) experimented the effect of Problem Based Learning on social skills of students and revealed that PBL enhances students’ social skills.
Glasserfield (1993) made a study on the effect of social skills interventions in the primary school and revealed that training to children in friendship making is important for their proper social development.

Lonston & Cantor (1989) studied the interpersonal success and failure of college students for several months. They found that students who were socially successful perceive new social situation as an interesting challenge and create opportunity to make new friends.

Sheinker & Sheinker (1988) through their study, a metacognitive approach to social skill training: A program for Grades 4 through 12, made an attempt to teach students how to self direct, self monitor, self evaluate and self correct in order to produce appropriate social behavior. Three pilot groups were selected for this purpose and provided the metacognitive social skill training program. All groups experienced improvement in social skills after the training program.

Elliot & Greesham (1984) conducted a study on Children’s social skill assessment and classification practice. They define social skill by placing emphasis on social validity of the behaviour. One of the important social outcomes predicted through his study was peer acceptance.

Cartledge & Milburn (1980) explained that social skills are those social, interpersonal and task related behaviours that produce positive consequences in the school classroom settings.

Toch (1980) reported that persons who are involved in aggressive encounters are sorely lacking basic social skills.
3.3.4 Studies Related to Academic Anxiety

Vijayakumari (2010) in her study, some correlates of academic achievement of secondary school students revealed that academic achievement is negatively related to academic anxiety and positively related to academic achievement.

Ghaderi (2009) investigated the Relationship between Self Efficacy and Anxiety among Indian and Iranian students. Results showed that students with low self efficacy had higher anxiety, and Indian students had higher anxiety compared to Iranian students. Students studying in master’s degree had higher scores on anxiety compared to students pursuing PhD programs.

Saikia & Phukon (2009) made an inquiry into the Parental aspiration and Anxiety level among higher secondary students of Jorhat (Assam). The study found that students belonging to science stream had high anxiety level in comparison to the students of arts and commerce streams respectively. Also there was significant difference between boys and girls in anxiety level, with girls obtaining more mean anxiety scores than boys.

Singaravelu (2009) studied the relationship between Test anxiety and Academic achievement in mathematics of high school students. Findings of the study revealed that higher the test anxiety, lower was the academic achievement in mathematics. Also students with average level of test anxiety achieved more than the students with high and low levels of test anxiety.

Bhansali & Trivedi (2008), made a study to find out the gender differences in incidences and intensity of Academic anxiety among adulterants. The results showed that considerable amount of Academic anxiety prevailed amongst the sample. It was seen that girls on the whole had more incidence and intensity of academic anxiety in comparison to boys.

Dwivedi & Gunthey (2005), Studied the influence of medium of instruction on level of academic anxiety among school students. The result of the study revealed that academic anxiety level of English
medium students was significantly greater than the students of Hindi Medium.

Lopez (2005) conducted a study about trait anxiety and ages to predict state anxiety of school children. The study showed that the trait anxiety of children was strong predictors of their state anxiety in a stressful situation but not in a relaxed one. Compared to trait anxiety, age was found to be a weaker predictor of the state anxiety of children in either situation.

Singh (2003) in his study, A study of anxiety among medical post graduate students in relation to sex, intelligence and socio economic status found that significant difference in anxiety exists in post graduate students in relation to independent impact of sex. Also no significant difference in anxiety exists in post graduate students in relation to independent impact of intelligence. PG medicos of high and low SES differ significantly in relation to independent impact of SES

Griffin & Griffin (1998), in their study, an investigation of the effect of reciprocal peer tutoring on achievement, efficacy and test anxiety suggest that improved self efficacy may be associated with reduced stress.

Smith (1975) found that if an individual’s experience is negative, then the test anxiety level will be higher leading to lower performance. Consequently, if an individual’s experience is positive, then the test anxiety level will be lower leading to higher performance.

**Conclusion**

The review of literatures revealed the importance of metacognition and multimedia in students’ learning and performance. Training in metacognitive strategies enables learners to monitor and self correct their own problems in learning. Technology-rich environment can help the students to sustain their interest in learning and also their retention power. The findings of various studies seem to support the use of multimedia technology as a viable educational tool.
The search on literature also reflects that metacognition and multimedia are significantly related to variables like self efficacy, adjustment, achievement motivation, emotional intelligence, scientific creativity, social skills, academic achievement, socio economic status, test anxiety, academic stress, retention etc.
References


Anshu (2006), *Comparitive effectiveness of single medium and Multimedia on learning gains of 9th grades in chemistry at different...*
levels of academic achievement and intelligence. Ph.D., Education, C.C.S. University, Meerut.


Begum, J.A., & Balasubramanian (2008), Metacognitive awareness among the medical college students of Tamilnadu. Pedagogics, 58-61


