CHAPTER I
INTRODUCTION

It is widely accepted that teaching skills are critically important in our technologically sophisticated world. An educator directs, plans, monitors, evaluates and reflects their instructional behavior and this can promote learners learning with understanding. The difficulties in teaching and learning mathematics have received considerable attention by educators and professional organizations. Factors associated with learning quantitative contents such as introductory mathematics are complicated. Review of the research literature suggests that these may include the metacognitive domain on the ability of learning, the affective domain on achievement and attitudes. Since mathematics is generally accepted as a gateway subject enabling discipline Pandor N (2006) to improve study, it can be described as a critical mass in education. Adequate learning facilitation in mathematics subject is of pivotal importance in any country education in all the levels and grades. The main goal of mathematics education in schools is motivate the child’s thinking. Clarity of thought and pursuing assumptions to logical conclusions is central to the mathematical enterprise. There are many ways of thinking, and the kind of thinking one learns in mathematics is an ability to handle abstractions, and an approach to problem solving.

The students utilize a variety of different intuitive approaches to solving math problems. For the successful solution of any complex problem a variety of metacognitive processes is necessary. Metacognitive abilities in mathematics mainly can be used for focusing on outcomes rather than technique, making learning experimental, giving students control over their own learning, motivating for studies etc. Metacognition or the monitoring of one's mental activities is essential to employing the appropriate information and strategies during problem solving. It involves student’s awareness and self regulation and thinking of their cognitive processes Campione, Brown & Connell (1989). The control of metacognition involves a variety of decisions and strategies, including identifiable behaviors as predicting, planning, revising, selecting, checking, guessing & classifying Artzt A. et al. (1992) etc.

The need to understand and make use of mathematics in the workplace and daily life has been greater today than past and will continue to increase. The level of mathematics
required for intelligent citizenship and the mathematics knowledge required in the workplace
and in professional areas has increased dramatically. Consequently, all students need to
receive a high quality mathematics education and learn mathematics in order to guarantee the
production of quality in many professional areas ranging from education to health care to
technology and to engineering.

Research has shown that a significant majority of students in remedial mathematics
do not remediate successfully George & Michael (2012). Such widespread failure raises the
question of motivation. Some would argue that the instructor should directly compel students
to commit themselves to the course and its work. This can be done by mandating attendance
and/or by instructor student intervention. However, such tactics may be self defeating
because of the way in which they may negatively affect student autonomy, which has been
shown to be a positive factor in education. This argues that student autonomy should be taken
into consideration when choosing strategies through which students are motivated for
achievement.

Mathematics is a living subject which seeks to understand patterns that permeate
both the world around us and the mind within us. Although the language of mathematics is
based on rules that must be learned, it is important for motivation that students move beyond
rules to be able to express things in the Language of mathematics. This transformation
suggests changes both in curricular content and instructional style. It involves renewed effort
to focus on:

• Seeking solutions, not just memorizing procedures;

• Exploring patterns, not just memorizing formulas;

• Formulating conjectures, not just doing exercises.

As teaching begins to reflect these emphases, students will have opportunities to
study mathematics as an exploratory, dynamic, evolving discipline rather than as a rigid,
absolute, closed body of laws to be memorized. They will be encouraged to see mathematics
as a science, not as a standard and to recognize that mathematics is really about patterns and
not merely about numbers National Research Council (1989). Mathematically powerful
students are quantitatively literate. They are capable of interpreting the vast amounts of
quantitative data they encounter on a daily basis and of making balanced judgments on the basis of those interpretations. They use mathematics in practical ways from simple applications such as using proportional reasoning for recipes or scale models, to complex budget projections, statistical analyses and computer modeling. They are flexible thinkers with a broad repertoire of techniques and perspectives for dealing with novel problems and situations. They are analytical, both in thinking issues through themselves and in examining the arguments put forth by others.

1.2 CONCEPTUAL FRAMEWORK

1.2.1 Achievement in Mathematics

Mathematics is generally accepted as entrance subject to all basic and advanced studies, it can be describe as a significant topic in education, and adequate learning facilitation in this subject is of key importance in any educational step. Structure of mathematics includes the ability to estimate, to decide whether the answers to problems are acceptable or not, calculating skills and abilities that indicate insight into the reasons etc. Research in mathematics education shows the difficulties students have in acquisition of mathematical concepts. An instructional strategy is crucial to the understanding of mathematical concepts. Effective instruction requires the teacher to step outside the realm of personal experience in to the world of the learners. It is the learners who must be engage for learning to occur, the learner is the one who must make the commitment to learn Newman et al. (1995) pointed out that for learning mathematics to be meaningful (authentic) it must be individually constructed. Learning takes place as student process, interpret and negotiate the meaning of new information. Mathematical skills are heavily influence by the prior knowledge, values, expectations, reward and sanctions that shape the learning environment in mathematics.

The aim of the study of Yildirim & Selda (2012) was to examine the role of motivational beliefs in mediating the relationship among perceived teacher support, learning strategy use, and student achievement. The author analyzed the programmed for international student assessment mathematics scores and questionnaire responses of 4,855 fifteen year old students in Turkey via multilevel analysis. Results indicated that perceived teacher support was positively related to learning strategy use in mathematics and that this relation was mediated through math self-efficacy, anxiety,
intrinsic value, and instrumental value. Self efficacy and anxiety were in turn, correlated with programmed for international student assessment mathematics achievement. In addition, the author found between school SES differences to be strong predictors of math self-efficacy, anxiety and achievement.

1.1.2 Motivation and Learning Strategies

The problem of learning and motivation has been central theme of philosophy since ancient times to understand how an individual modifies his/her behavior through reorganization of experiences. There has been problem of conceptualizing in these issues, especially in the context of teaching learning process. The psychologists, being dissatisfied with the explanation of human behavior and concept of goal directed behavior. They introduced the concept of motive which incorporates the meaning of both drive and goal directed behavior.

More of the research on learning in educational field has been focused on student’s knowledge and use of learning strategies, their metacognitive skills and their ability to self regulate. Pask (1976) found that students conceptual understanding, found them using different learning strategies in seeking understanding. They have distinct preferences in the styles of learning they adopted. Some students adopt a holist style in which right from the start they tried to see the task in the widest possible perspective establishing an overview which went well beyond the task itself. Their learning process involved the use illustration, examples, analogies, and anecdotes in rooted personal experience and beliefs. Other students preferred a serial list style in which they began with a narrow focus, concentrated on details and logical connection in a cautious manner and looked at broader context only towards the end of the topic.

Weinstein and Mayer (1986) identified three types of learning strategies among college students: (1) Basic rehearsal e.g. recopying notes, underlying text. (2) Elaboration e.g. building internal connection with images, summaries, analogies etc. (3) Organization e.g. outlining, diagramming, networking etc. Metacognitive strategies include planning, monitoring and self regulation. The measurement of learning and its antecedents in a systematic manner has revolved around four major attribute of successful learners that pertain to work methods, e.g. promptness to complete task, teacher approval i.e. favorable
opinion about teachers and teaching learning process, accomplishments of educational objectives.

An inventory, the Study Process Questionnaire (SPQ) was developed independently by Biggs (1978 & 1987). The inventory following factor analysis, typically produce three main factors in which an approach to learning is supported by distinctive form of motivation. Pintrich et al. (1991) developed motivational strategies for learning questionnaire (MSLQ) having 15 subcomponents covered under three domain: 6 related to motivation, 5 to cognitive & metacognitive strategies and 4 to resource management strategies. This tool is being used as a most comprehensive inventory to deal with learning and motivation of students pursuing higher education.

Learners at all levels use strategies such as reading text repeatedly, copying notes, consulting peer and asking instructors for clarification to actively process information and thereby influencing their mastery of material Pintrich et al. (1993). In fact, motivated strategies for learning are an important aspect of student academic performance in the classroom, especially for the college and university students. The theoretical framework on motivated strategies for learning build up by Mckeachie et al. (1986), Pintrich (1989), Pintrich & Degroot (1990), Pintrich & Gracia (1991) has implicated two separate domain motivation and learning strategies. The motivation domain covers students intrinsic goal orientation, extrinsic goal orientation and task value and these attributes make up the value component, control of learning beliefs and self efficacy for learning and performance which makes up the affective component. For learning strategies domain, it covers rehearsal, elaboration, organization, critical thinking and self regulation, which makes up cognitive and metacognitive component.

1.1.3 Motivational Beliefs

The scientific concept of motivation has a long history. Pintrich & Schunk (1996) have noted that some early theorists have traced the concept of motivation back to Plato and Aristotle who discuss “willingness”. Nineteenth century scholars associated motivation with wills, volition or instinct, depending on how deterministic their worldview was. The theory that all behavior was instinct lost popularity in the 1920’s, when it could not stand up to scientific scrutiny Altman et al. (1985). The concept of volition as a source of motivation occurs with many of today’s views, but offers no insight into the process of motivation.
Motivation is also one of the founding constructs of psychology. At the time the term was translated as instinct but closer in meaning to “drive” or “motivation” Pintrich & Schunk (1996).

Motivation refers to the forces encouraging a person to engage on a task or to pursue a goal; in the school setting it concerns the reason for which a student works persistently to reach desirable result, Wolters & Rosenthal (2000). Motivational beliefs refer to the opinions, judgments and values that students hold about objects, events or subject matter domains. Motivational beliefs act as a frame of reference that guide student’s thinking, feelings and actions in a subject area. For example motivational beliefs about mathematics determine which strategies student think are appropriate to do specific tasks. It is noteworthy that a student’s beliefs about a domain may be dominantly favorable (optimistic) or unfavorable (pessimistic), thus providing a positive or negative context for learning. Knowledge of the students’ motivational beliefs will help us to create learning environments that are well suited to their psychological needs. Motivation is also one of the founding constructs of psychology.

The Latin root of the word “motivation” means “to move” hence in this basic sense, the study of motivation is the study of action Eccles & Wigfield (2002). Motivation in field of classroom learning is based on how learners think about the consequences of their behavior (motivational beliefs). Motivational beliefs also refer to the students’ opinions of the efficacy or effectiveness of learning and teaching methods. According to Pintrich (1999) motivation is the most important component of learning in any educational environment. It is considered to be one of the best determining factors of students' success.

Leonard & Scholl (1995) proposed five factors as the sources of motivation. Instrumental motivation (rewards and punish), Intrinsic process motivation (enjoyment and fun), Goal internalization (self determined values and goals), Internal self concept based motivation (matching behavior with internally developed ideal self), External self based motivation (matching behavior with externally developed ideal self). Individuals are influenced by five factors, though in varying degrees than can change in specific situation.

Motivation is one of the most important components of learning in any educational environment Maehr (1984). The field of motivation is so broad and rich that in just 60 years that have been major upheavals in the field of metaphors and important new areas uncovered.
with essential new concepts introduced. Motivational Beliefs are cognitive meditational variables that are constructed by the child through his/her success/failure expectation and are influenced by the adults who interact with him/ her and influence subsequent effects in similar act (Skinner & Belmont, 1993).

According to Franken (1994), Motivation is the arousal, direction and persistence of behavior. Motivation as definition given by earlier is the simulation of action towards a particular objective where previously there was little or no attraction to the goal, Stipek (1988). Motivation also affects the learning strategies and cognitive processes individuals employ Eccles & Wigfield (1993).

Motivation is the study of why people think and behave as they do. Motivation is also the study of what pushes or pulls an individual to start, direct, sustain and finally end an activity. Consider for example, an achievement activity such as studying for an exam. Motivation researchers would want to examine what the person is doing: the choice of behavior; how long it takes that person to get started, how hard the individual actually works at the activity (the intensity of behavior); how long that individual is willing to remain at the activity (the persistence of behavior); and what the person is thinking or feeling while engaged in the activity, or the cognitions and emotional reactions that accompany behavior Wolters & Rosenthal (2000).

Linnenbeink & Pintrich (2002) refers different dimension of motivation and define it as an academic enable. They state that self efficacy attribute, intrinsic motivation and goals are significant for student’s motivation. Research in motivation has focused on this dimension of motivation called motivational belief. Motivation refers to those factors which increase and decrease the vigor of an individual’s activity. In education, motivation is called effort. In terms of effort, the study of student motivation searches for those factors which increase the student effort to make desirable responses. In the present study motivation consists of value component of intrinsic goal and extrinsic goal orientation along with task value.

**Intrinsic goal orientation**

Intrinsic goal orientation is having a goal orientation toward an academic task that indicates the students’ participation in the task is an end all to itself rather than participation being a means to an end. Also included here is the degree to which students perceive
themselves to be participating in a task for reasons such as challenge, curiosity, and mastery. It is related to engaging in an activity for its own sake, for mastery and learning purposes. For a student, this means a concern about grades, pleasing others, or being better than others Pintrich et al. (1994). A student is described as intrinsically motivated when he or she actively engages in learning because of curiosity, interest, enjoyment, or in order to achieve his or her own intellectual and personal goals. On the other hand, motivation that stems from factors such as interest or curiosity is called intrinsic motivation. Intrinsic motivation is the natural tendency to seek out and conquer challenges as individuals pursue personal interests and exercise their capabilities Deci & Ryan (1985). When students are intrinsically motivated, they tend not to need any incentives because the activity itself is rewarding to them. In contrast, extrinsic motivation is motivation to engage in an activity as a means to an end.

It is directly linked with the natural instincts, urges and impulses of the organism. The individual, who is intrinsically or naturally motivated, performs because he finds interest within the activity. The individuals are engaged in learning something because he rives pleasure within the learning of that thing. The activity carries its own reward and the individuals take genuine interest in performing the activity due to some outside motives and goals. Goal orientation refers to the student perception of the reasons why to engage in a learning task. Although a number of studies have discussed goal orientation using alternative terms and definitions Pintrich, P.R. & De Groot E. (1999). Positive personal goals have more impact long term then negative. Focus goals acts as an individual, learning, progress and mastery. Goal orientation always encourages students to evaluate their goals to share their evaluation. Intrinsic goal orientation concerns the degree to which a student perceives himself to be participating in a task for reasons such as challenge, curiosity and mastery, using self set standards and self improvement. Motivation can be viewed as a continuum from extrinsic motivation to intrinsic motivation (Zimmerman, 1989) however, academic motivation varies as a result of impacting factors such as learner interest, enthusiasm, learner self-efficacy and valuation of the relevance of the content to current and future learning and goal attainment (Knowles, Holton& Swanson,2005).
**Extrinsic goal orientation**

Extrinsic goal orientation concerns the degree to which students perceive themselves to be participating in a task for reasons such as grades, rewards, performance evaluation of others and competition. Students with high in extrinsic goal orientation engage in learning tasks as the means to an end. The main concern here is that students with high Extrinsic Goal Orientation relate to issues other than those directly related to participating in the task itself. This is the source of pleasure and does not lie within the task. These kinds of motivation have no functional relationship to the task. The student does or learns something not for its own sake, but as a means of obtaining desired goals or getting some external reward, working for better grade or honor. Individuals who have high extrinsic motivation perform better in programmer then the students with lower extrinsic motivation. Individuals who have high extrinsic motivation will use more cognitive, metacognitive and resource management strategies then individuals with lower intrinsic motivation. Extrinsic goal orientation denotes that a student participates in a task for reasons such as grades, rewards, performance, evaluations by others and competition Hamilton & Elizabeth (1994). It was found that mastery goals are positively related to performance in general tasks for middle school students, while on the contrary extrinsic goals were negatively related to performance in the same tasks for the same students.

**Task Value**

Task Value refers to student evaluation of how interesting, how important and how useful the task is. High task value should lead to more involvement in learning. Task value refers to the students’ perceptions of the course material in terms of interest, importance and utility. Task value beliefs refer to the students’ evaluation about the value of the task. High task value should lead to more involvement in ones learning. Eccles (1983) has proposed that three components of task value are important of the task, their personal interest in the task and their perception of utility value of the task for future values. Elias (2007) & Pintrich (2001) have proposed that a student may be motivated towards working on a task if the task itself is important, interesting and useful for him (e.g. help him to cope with high school demands or for his career and life in general). It has been found that task value beliefs are correlated to performance, even though not as strongly as self-efficacy correlates. Engagement in the task varies with the value that students place on the academic task and
student self confidence in their ability to accomplish the task successfully if effort was made Brophy (1983).

Control of learning beliefs

Control of Learning Beliefs refers to student belief that their efforts to learn will result in positive outcomes. It concerns the belief that outcomes are contingent on one’s own effort, in contrast to external factors such as the teacher. If students believe that their efforts to study make a difference in their learning they should be more likely to study more strategically and effectively. That is, if students feel that they can control their academic performance, they are more likely to put forth the effort to effect the desired changes. It concerns that the factors such as teacher. If individuals believe that their efforts to study make a difference in their learning, they should be strategically and effectively made. It is an individual's beliefs about the presence of factors that may facilitate or impede performance of the behaviour. The concept of perceived behavioral control is conceptually related to self-efficacy. In shaping control experiences, control beliefs have two main functions: (1) when preparing to take on an activity, expectations of control have a regulatory function in that they shape how people approach and engage in the task; and (2) following an action outcome episode, they have an interpretative function, in that they help translate the meaning of the experience for future control.

Self Efficacy

Self efficacy comprises two aspects of expectancy: expectancy for success and self-efficacy. Expectancy for success refers to performance expectations and relates specifically to task performance. Self efficacy is a self-appraisal of one’s ability to accomplish a task and one’s confidence in possessing the skills needed to perform that task. Self efficacy is a major component of Bandura’s (1986) social cognitive theory. Self efficacy is one of more important motivational beliefs for student achievement, which concerns beliefs about capabilities to do a task or activity. More specifically, self efficacy has been defined as individuals’ beliefs about their performances capabilities in a particular context or a specific task or domain Bandura (1997). In particular, self-efficacy has been positively related to higher levels of achievement and learning as well as wide variety of adaptive academic outcomes such as higher levels of effort and increased persistence on difficult tasks in both experimental and correlation studies involving students from a variety of age groups Pintrich
& Schunk (2002). Students who have more positive self efficacy beliefs that are they believe they can do the task are more likely to work harder, persist and eventually to achieve higher levels. In addition, there is evidence that students who have positive self efficacy beliefs are more likely to choose to continue to take more difficult courses (e.g., advanced math courses) over the course of schooling Eccles et al. (1998). For example, students who view themselves as capable to solve mathematical problems will choose to perform that task compared to low efficacious students who might attempt to avoid involvement in the task. Self efficacy is a self appraisal of one’s ability to master a task. It includes judgments about one’s ability to accomplish a task as well as ones confidence in ones skills to perform that task. Self efficacy first of all involves an analysis of task requirements. Bandura (1988) argues that self appraisal is a process in which different sources of information may vary across the domains of functions and situations. Efficacy beliefs differ in generality, strength and Level. Individuals may judge him across a wide range of activity domain or not only in certain domains of functioning. Weak efficacy beliefs are easily negated by discontinuing experiences, whereas people who have a tenacious belief in their capabilities will persevere in their efforts despite innumerable difficulties and obstacles. As the sense of personal efficacy is stronger, greater will the perseverance and the higher the likelihood that the chosen activity will be performed successfully. Bandura (1997 & 2001) indicates that self efficacy plays a key role in human functioning because it affects behavior not only directly, but by its impact on other key determinants such as goals and aspirations, outcome expectation and perceptions of impediments and opportunities in the social environment. Bandura (1986 & 1995) & Maddux (1995) says that efficacy beliefs influence whether people think strategically, optimistically or pessimistically, what course of action they choose to pursue, the challenges and goal they set for themselves and their commitment to them.

Test Anxiety

Test Anxiety has been found to be negatively related to expectancies as well as to academic performance. Test anxiety is thought to have two components: a worry, or cognitive component, and an emotionality component. The worry component refers to students’ negative thoughts that disrupt performance, whereas the emotionality component refers to affective and physiological arousal aspects of anxiety. Test anxiety is a measure of how much one worries about test and how often disturbed the thoughts when an individual
take an examination. Test anxiety consists of two components worry and emotionally. Worry refers to student negative thoughts that disrupt performance and emotionally refers to affective and physiologically aroused aspects of anxiety. It refers to those physiological and behavioral responses that accompany concerns about possible failure. Anxiety generally refers to an unpleasant emotional reaction those results from the perception or appraisal of a particular situation as threatening. Anxiety is not a signal unitary response but it is a joint function of personal variables and situational variables. Personal variable consist of cognitive and behavioral tendencies acquired by persons through individual and social learning experiences. These tendencies interact with situational cues capable of eliciting anxiety response.

1.1.4 Learning Strategies

Learning strategies are defined as the process we use to activate and sustain our thoughts, behavior and emotions in order to reach our goals. When the goal involves learning we talk about learning. Zimmerman (2002) extends this definition highlighting that learner regulate and control their cognition, motivation and behavior to obtain set goals guided and constrained by both personal characteristics and the contextual features in the environment. Learners also differ from each other in more subject specific aptitude for learning e.g. some being better at verbal then numerical things, others vice versa Blackmore (1996) suggested that one of the first thing educators can do to aid, the learning process is to simply be aware that there are diverse learning styles in the students. There are probably as many ways to teach as there are to learn. Learners have different preferences for how, when, where and how often to learn has defined learning styles as personal qualities that influence a student ability to acquire information, to interact with peers and the teachers and otherwise, participate in learning situation. Learning strategies assessed by the MSLQ are rehearsal, elaboration, organization, critical thinking and metacognitive regulation.

Mathew (1991) argues that students have more positive attitudes towards school and colleges to achieve more knowledge and skills when taught, counseled or advised through their natural or primary style rather than a style that is secondary or underdeveloped, particularly when adjusting to a novel and new situation that creates such as beginning situation in higher education. Generally cognitive styles are more related to theoretical or academic research, while learning styles are more related to practical application.
According to Riding and Sadler (1977) among college students, types of instructional material treatment, such as abstract or pictorial presentation and cognitive styles have been very important influences on learning performances. The students who are analytic imager dimensions improve the more pictorial presentation about certain types of contents.

Robothom (1999) considered that the students will develop a way or style of learning and refine that style in response to three groups of factors. Unconsciousness personal interventions by the individual, consciousness interventions by the learners themselves and interventions by some other external agents lead to learning. Learning strategies are important in today’s world or lifelong learning environment. Today’s society is facing up technological revolution where technology and information constantly changing.

Berger et al. (2011) considerable evidence indicates that student motivation and use of learning strategies are related. There is insufficient understanding, however, about their reciprocal effects whether motivation affects strategy use, the converse, or whether the effects are bidirectional and which components of motivation and strategies are involved. A two wave longitudinal design was used to examine this issue among 9th grade students (N = 306) enrolled in high school mathematics classes during an academic term. A cross lagged structural model found that students’ self efficacy in mathematics and value predicted their reported use of learning strategies. There was no evidence, however, that learning strategy use predicted motivation and, thus, support for unidirectional effect of motivation during that time interval. Implications for models of self regulated learning and instruction are discussed by author.

It includes cognitive strategies for rehearsing, attending to, encoding and retrieving relevant verbal information and intellectual skills. Cognitive activities associated with learning generally planning a problem solving approach or solution strategy monitoring, understanding and comprehension, evaluating progress towards one, goals and effectiveness and efficiency of solution strategies and modifying ones approach to problem solving. Keefe (1979) believed that learning strategies are characteristics cognitive, affective and psychological behaviors that serve relatively stable indicators of how learners perceive, interact with and respond to learning environment. Cognitive psychologist made a distinction between rote learning a meaningful learning by Ausubel, et al. (1978) rote learning is verbatim memorization and is not necessarily accompanied by any understanding of terms.
Sometimes learners are unable to explain information that is learning by route and they are not able to translate the information in their own words. Meaningful learning on the other hand, is learning that is tied to previous knowledge and it is understood well enough to be manipulated, and applied to novel situation most learning is neither completely rote nor meaningful and can be placed on a rote meaningful continuum. Asubel (1968) & Eric Hobson (2001) believed that metacognitive strategy is a necessary condition for academic success, knowledge alone is not sufficient. Learners must be motivated to expand the time and effort to implement the strategies. Bandura (1978), Bandura and Adams (1978), Kinzie (1990), Mclnerny (1994) believed that primary goals are advancing knowledge and improving understanding meaningfully according to the needs and interests of learners. They tend to actively analyzing their needs and interests of learners. Metacognition is defined as individual’s knowledge about their own cognitive processes Flavell (1987), Payne (1992) and Pintrich et al. (1991) suggested that cognitive and metacognitive strategies can be categorized and compared within the contextual environment of a specific course. This category includes (a) rehearsal (b) Elaboration (c) Organization, (d) Critical thinking and (e) Metacognitive self regulated strategies. Metacognitive strategies can be defined as those strategies that help students focus on planning, monitoring, and controlling their cognition. Such strategies can take the form of self testing, monitoring of one understands of course content or repairing one understands by re reading or doing more problems (Pintrich, 2000). This includes metacognitive strategies such as planning, monitoring and evaluating knowledge about the task and goal, strategies and human cognition.

Rehearsal

A rehearsal strategy uses repeated practice of information to learn it. When a student is presented with specific information to be learned, such as a list, often he will attempt to memorize the information by repeating it over and over. The repeated practice increases the student’s familiarity with the information. For many people, the learning of our social security number, or the items we want to pick up at the books store prompts us to use rehearsal strategies include the recitation of information to be learned and mnemonic techniques for memory tasks. Rehearsal strategies commonly involve reciting or naming items to be learned. These strategies are best used for simple tasks and activation of information in working memory rather than acquisition of new information in long term
memory. This assumption is that these strategies influence the attention and encoding processes, but do not appear to help students construct internal connections among information or integrate the information with prior knowledge.

An example of strategies in this category would be repeating, in correct serial order, the names of the colors in the spectrum. There are a number of different educational tasks that require simple recall. This is particular true at lower educational levels and in introductory courses at the post secondary level. Pintrich & Mckeachie (2000) believed that rehearsal strategy of learning is outlined as a basic cognitive style with elaboration and organizational strategies of learning. A rehearsal strategy uses repeated practice of information to learn it. When a student is presented with specific information to be learned, such as a list, often he will attempt to memorize the information by repeating it over and over. He may say the words out loud, or he may sub vocalize the information. The repeated practice increases the student's familiarity with the information. For many people, the learning of our social security number, our telephone number or the items we want to pick up at the grocery store prompts us to use a rehearsal strategy.

**Elaboration**

An elaboration strategy is where the student uses elements of what is to be learned and expands them. The student expands the target information by relating other information to it. This strategy helps student to store information into long term memory by building internal connections between items to be learned. Some of the strategies include paraphrasing, summarizing, creating and connecting new information with prior knowledge. Elaboration involves forming helpful connections between new and old information said by Derry (1990): McInerney & Maclnerney (1988) and Reader (1980). Elaboration implies that students are active in constructing their own knowledge and do so in ways which enhance effective recall or information Gagne (1985): Reader (1980). Elaboration sub strategies include paraphrasing summarizing, creating analogies, active note taking and question asking Pintrich & Schrauben (1992). Elaboration refers to the way in which students systematically structure their knowledge.
Organization

Organizational strategies include clustering, outlining and selection the main idea from the text, meaning thereby organizational strategy is the ability to select the main idea from readings as well as attempts to organize and put together when a student needs to learn in this course. This strategy helps students to select appropriate information and also construct connections among information learned. Organization strategies include clustering, outlining and selecting main ideas Pintrich et al. (1991). Organizing in active, effort full tasks those results in the learner being closely involved. This should result in better performance. He further said that organization strategies include outlining grouping, selecting the main idea from reading passages and paying attention to headings, diagram, tables, figure, charts and graphs. An organizational strategy is like a transformational strategy in that it allows the learner to manipulate information. Students manipulate, integrate and/or otherwise interact with the information so that it is more easily learned and remembered.

Critical Thinking

It is described as a student applying previous knowledge to new situations. Students ability to solve problems, make critical evaluation, and comparison or reach decision with respect to students of excellence. Critical thinking refers to the degree to which students report applying previous knowledge how situation in order to solve problems and each decision or critical evaluations with respect to standards excellence. It is the purposeful and reflective judgment about what to believe or what to do in response to observations, experience, verbal or written expressions, or arguments. It involves determining the meaning and significance of what is observed or expressed or concerning a given argument, determining whether there is adequate justification to accept the conclusion as true. Critical thinking is defined as skilled, active, interpretation and evaluation of observations, communications, information, and argumentation. It is deliberated determination of whether one should accept or reject about a claim and the degree of confidence about accepts or rejects it.

Self Regulation

The term self regulated learning (SRL) became popular in the 1980, because it emphasized autonomy and responsibility of students to take charge of their own learning. Pask (1990) regarded it as a valuable term because it emphasized how the “self” was the
agent in establishing learning goals and tactics and how each individual’s perception of the self and task influence the quality of learning that ensured. Self regulation refers to the self directed process through which learners transform their mental abilities into task related skills Zimmerman (2001). This is the method or procedure that learners use to manage and organize their thoughts and convert them into skills used for learning. Bigg (1978) defines self regulation as the process of continuously monitoring progress toward a goal, checking outcomes and redirecting unsuccessful efforts. To be self regulated, students need to be aware of their own thought processes, motivated and to actively participate in their own learning process Zimmerman (2001). Self regulation techniques are widely used. Successful people and learners use self regulation to effectively accomplish a task. They will regulate different strategies and then monitor the effectiveness of that strategy while evaluating and determining the next course of action. Generally, successful learners already utilize various forms of self regulation. Instruction in the use of self regulation is typically directed towards students who are not currently using such techniques, and consequently are not successful in educational settings. Through the use of strategies and self regulation, performance can be greatly improved. The use of self regulation techniques assists students in performing tasks more effectively and independently. For example, successful learners will constantly check their comprehension. When successful learners read a passage, and realize that they do not understand what they have read, they will go back and reread, and question or summarize what they need to understand. Self regulation is neither a measure of mental intelligence that is unchangeable after a certain point in life nor a personal characteristic that is genetically based or formed early in life. Students learn self regulation through experience and self reflection Pintrich (1995). Self regulation is defined as the process we use to activate and sustain our thoughts, behavior and emotions in order to reach our goals. When the goal involves learning we talk about self regulated learning. Zimmerman (2002) and Pintrich & Zusho (2002) extends this definition highlighting that self regulated learner regulate and control their cognition, motivation and behavior to obtain set goals guided and constrained by both personal characteristics and the contextual features in the environment. Self regulated learners have a combination of academic learning skills and self control that makes learning easier. In other words they have a skill and the will to learn self regulated learners and motivated to learn. Self regulation refers to metacognitive adjustments students make
concerning errors. This may be as a result of inherent knowing, trial and error or hypotheses formulation. Executive control may be transferred to students through modeling as they adapt modeled processes for their own use. Social interaction provides additional models while feedback from peers lets learners observe the comprehension strategies of others. Since many researchers express concerns about reliance on external prompts, self regulation should strive to strike a complementary balance between external cueing and internal regulating mechanisms.

Self regulation has been found to be positively correlated to achievement, with highly self regulated students being more motivated to use planning, organizational, and self monitoring strategies than low self regulated. Pintrich and his colleagues (1994) have articulated a model of student cognition, which argued that students regulate their cognition by using motivational strategies in addition to cognitive and metacognitive strategies. Pintrich & De Groot (1990) found a positive correlation between motivational beliefs and self regulated learning and furthermore, all affective components were related to academic performance.

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Self regulated students, who employ cognitive and metacognitive strategies plan, organize self instruct and self evaluate at various stages during the process of information acquisition. Cognitive strategies are defined as the behaviors and thoughts in which students are engaged in while studying.

**Study Habit**

It involves the effective use of time to study, planning weeks or smooth ahead, effective use of the study time for the realistic setting of goals. Study habit environment also refers to the physical place where students study. Time management involves scheduling,
planning and managing ones study time. Research found that time planning and management training helped students to better self regulate their use of time and improved student’s grade point average Zimmerman (1994).

**Effort Regulation**

It is the ability to deal with failure and building resiliency of drawbacks when self regulated learners find inadequate learning strategies they regulate their learning activities. Effort Regulation is the tendency to maintain focus and effort towards the goal despite potential distraction Corno (1994) Research shows that effort regulation was a strong predictor of academic success Doljanac (1994): Lee (1997).

**Peer Learning**

Peer learning is a process of cooperation at level which provides an opportunity for policymakers and practitioners from one strategy to learn from the experiences of their counterparts elsewhere in other applications through direct contact and practical cooperation. Finally peer learning strategy is different from other learning strategies in social interaction. Therefore, it is likely that social motives will influence the use of help seeking Ryan and Pintrich (1998). Thus peer learning are also one of the learning strategies that effect motivation in general and academic.

**Help Seeking**

This factor is valid as a student asocial ability to ask help from peers in his/ her study problem. Another aspect of the environment that students learn is to manage the support from other students or instructions. A good student knows when and how he/ she need help and can also identify the person from whom to ask help. Effective help seeking is an important strategy that is fundamental to successful learning whenever the students knowledge or comprehension is sufficient to enable independent resolution of a problem Karabenick & Knapp (1991) : Newman & Schwager (1995) & Ryan : Hicks (1997). It is not only a strategy that can help students to address their immediate needs. They also believe that it can also be a way of improving their performance.

**1.3 SIGNIFICANCE OF THE STUDY**

Today in the technological world learning strategies are very important. In a classroom when teacher gives a lesson first of all he/she plans a lesson. Then after planning theory lesson he/she monitors, evaluates and reflects their instructional behavior. This can
promote learners learning with understanding. Learning strategies has the potential to increase the meaningfulness of student’s classroom learning and creation of a mathematics culture in a classroom. Learning strategies is an important aspect of student learning and academic performance in classroom context. Different cognitive strategies such as rehearsal, elaboration and organizational strategies have been found to foster active cognitive engagement in learning and result in higher level of achievement Weinstein & Mayer (1986). The second category is metacognitive self regulation. These are concerns with planning, monitoring and modifying the cognitive. The third important category of learning is known as resource management strategy.

This study is designed to address aspects of self regulation and self efficacy as they relate to critical issues in the design and evaluation of online learning programs, Yang et al. (2012). It begins with a discussion of the rapid growth of distance learning programs at all levels and across virtually all disciplines of educational programming. Much of this discussion is based upon the findings of research into the effects of embedded strategies on promoting the use of self regulated learning strategies (SRLS). It is an online learning environment and it discusses the ways in which the essential differences between face to face instruction and instruction through distance mechanisms relate to the readiness of individual learners to efficiently and effectively engage in learning, and key issues in instructional design.

Good readers know how to use cognitive and metacognitive strategies together to develop a deeper understanding of a book’s theme or topic. Students can think to a higher level. For many students, explaining their thought process is a daunting task. They may think, how do I explain what I think? I don’t know what to say. My teacher usually helps me out. These students need opportunities to take their thinking to a higher level and express themselves clearly. It will steer students into adulthood. Once Learning strategies are grasped, students will transfer use of these skills from their school lives to their personal lives and will continue to apply them as they mature.

In this rapidly changing world, the challenge of teaching is to help students develop skills which will not become obsolete. Learning strategies are essential for the twenty first century. They will enable students to successfully cope with new situations. Teachers and school library media specialists capitalize on their talents as well as access a wealth of
resources that will create a metacognitive environment which fosters the development of good thinkers who are successful problem solvers and lifelong learners. However, knowledge of cognitive and metacognitive and resource management strategy is not enough to promote students achievement at college and university level.

In thesis work we adopt the view that motivational beliefs and learning strategies should be studied as parts of an integrated whole, as neither component is alone sufficient to successfully interpret learning outcomes in students Achievement in Mathematics. Some studies by taking the above parameters are laid down in secondary students but no such studies are taken on college students in India, particularly in Punjab. Keeping in view the importance of motivational beliefs, learning strategies and its relation to Achievement in Mathematic and also dearth of studies in this vital area of research in Punjab the researcher proposes to undertake the research problem entitled as:

“Motivational beliefs and learning strategies as correlates of achievement in mathematics among college students of Punjab”

1.3 OBJECTIVES OF THE STUDY

The study is aimed to achieve the following objectives:

1. To develop and standardized tool for Achievement in Mathematics.
2. To study achievement in mathematics among the college students of Punjab in relation to stream and gender.
3. To study motivational beliefs among the college students of Punjab in relation to stream and gender.
4. To study learning strategies among the college students of Punjab in relation to stream and gender.
5. To study relationship of achievement in mathematics with motivational beliefs namely Goal orientation, Task value, Control beliefs, Self efficacy and Text Anxiety across the different streams namely art, commerce and science.
6. To study relationship of achievement in mathematics with learning strategies namely Rehearsal, Elaboration, Organization, Critical Thinking, Self regulation, Study Habit, Effort Regulation, Peer Learning, Help Seeking among the college students of Punjab.
7. To identify significant predictor of achievement in mathematics.
1.4 DELIMITATIONS

1. The centre of the proposed study is to explore the study of motivational beliefs and learning strategies in relation to achievement in mathematics among college students of Punjab.

2. The universe of the study will be delimited to students of degree colleges of Punjab.

1.5 OPERATIONAL DEFINITION OF TERMS

Motivational Beliefs

Motivational beliefs refer to those factors which increase and decrease the vigor of an individual’s activity. Thus it determines the level of degree of its activity. In educational field motivation is called effort. Motivational beliefs suggests motivational constructs in terms of value component (intrinsic motivation, extrinsic motivation, task value) expectancy components (control of learning belief and self efficacy for learning) and affective components (test anxiety).

Intrinsic Goal Orientation

This refers to an engagement in an activity for its own sake for the pleasure and satisfaction from the task.

Extrinsic Goal Orientation

This refers to external incentives such as money, grades or prizes for a person to perform a given task.

Task value

Task value refers to student interest in the task, which in turn foster a deep approach of leaning.

Control of Learning Beliefs

Control of learning Beliefs refers to student beliefs that their own efforts to learn will result in positive outcome.

Self Efficacy

Self efficacy refers to peoples beliefs in their capabilities to organize and execute courses of action to attain goals.

Test Anxiety

Test anxiety refers to measurement of how much one worries about tests and how much an often thought starts directing when an individual takes an examination.
Rehearsal

Rehearsal involves reciting or naming items from a list to be learned.

Elaboration

Elaboration helps students to store information into a long term memory by building internal connections between items to be learned.

Organization

Organization helps the learner to select appropriate information and also construct connections among the information to be learned.

Critical thinking

It is described as a student applying previous knowledge to new situations. Students ability to solve problems, make critical evaluation, and comparison or reach decision with respect to students of excellence.

Self Regulation

Self regulation refers to the self directed process through which learners transform their mental abilities into task related skills.

Study Habit

It involves the effective use of time to study, planning weeks or smooth ahead, effective use of the study time for the realistic setting of goals.

Effort Regulation

It is the ability to deal with failure and building resiliency of drawbacks when self regulated learners find inadequate learning strategies they regulate their learning activities.

Peer Learning

It refers as collaborating with one’s peers has been found to have positive effect on achievement.

Help Seeking

Help Seeking refers the aspect of the environment that students learn is to manage the support from other students or instructions.

Academic Achievement

Academic Achievement as the sum total of information gained after completing a course of instruction (partially or fully) in a particular grade that he has obtained on an achievement test.
Mathematics is the basic subject for all the entrance tests. Structure of mathematics includes the ability to estimate and to decide whether the answers to the problem are acceptable or not. Learning strategy involves the sequence process that helps the learner to regulate learning. In mathematics the Learning strategy like self regulation, critical thinking, and self efficacy are very helpful. By practicing and applying these strategies, students will become good readers, capable of handling any text across a curriculum. The thesis outcomes will be helpful to students in developing deeper understanding of Mathematics.