CHAPTER II: REVIEW OF RELATED LITERATURE

In this chapter, a humble attempt is made to report the most pertinent literature related to the present study under relevant headings.

EDUCATION: A THEORETICAL APPROACH

Education:
Etymologically, the word education is derived from *educare* (Latin) "bring up", which is related to *educere* "bring out", "bring forth what is within", "bring out potential" and *ducere*, "to lead".

The Report of Indian Education Commission (1964-66) stated that Education ought to be related to the life, needs and aspirations of the people and thereby made powerful instrument of social, economic and cultural transformation.

University Education Commission Report (1948-49) stated that Education to the Indian traditions is not merely a means of earning of living nor it is only a nursery of thought or a school for citizenship. It is initiation into the life of spirit a training of human soul is the pursuit of truth and the practice of virtues it is a second birth, divityam Janma”.

Durkheim, (1985) mentioned that Education is the action exercised by the adult generations over those who are not yet ready for social life. Its purpose is to arouse and develop in the child’s certain number of physical intellectual and moral states which are demanded of him both by the society as a whole and by the specific environment for which he is particularly destined education consist
of a methodical socialization of the young generation”.

Education can be defined as, “acquiring knowledge and developing spirit by applying techniques and technologies”. Teachers inculcate selfless attitude among students. Educated people realize the feelings of others. Education flourishes real happiness. Everyone reminds the needs of others in mind always. Developing various tools and methodology creates process effective. In a classroom it is the teacher’s role to understand the psychology of their students.

PSYCHOLOGY: A THEORETICAL APPROACH

Psychology is the science of behavior and mental processes. Its immediate goal is to understand individuals and groups by both establishing general principles and researching specific cases. For many, the ultimate goal of psychology is to benefit society. In this field, a professional practitioner or researcher is called a psychologist, and can be classified as a social scientist, behavioral scientist, or cognitive scientist. Psychologists attempt to understand the role of mental functions in individual and social behavior, while also exploring the physiological and neurobiological processes that underlie certain functions and behaviors. Psychologists explore such concepts
as perception, cognition, attention, emotion, phenomenology, motivation, personality, behavior, and interpersonal relationships. Some, especially depth psychologists, also consider the unconscious mind. Psychologists employ empirical methods to infer causal and correlational relationships between psychosocial variables. Psychology incorporates research from the social sciences, natural sciences, and humanities, such as philosophy.

Educational psychology concentrates on those aspects of the psychic activity that have to do with learning. Experimenting with animals and people, it tries to understand how they learn, and to devise better ways of teaching. A psychological school, known as behaviorism, maintains that every human behavior is a learned response to a stimulus, and consequently tried to establish learning as the central topic of psychology. The science dealing with mental phenomena and processes.

**Psychology – The Science of Soul**

The Greek philosophers conceived psychology as a science of soul. Definition of psychology as the science of soul has been discarded by the modern psychologists.

**Psychology – The Science of Mind**

Historically the French philosophers like Descartes (1596-1650) and the British philosophers like Locke considered psychology as the science of mind.

**Psychology – The Science of Consciousness**
Wundt defined psychology as the science of immediate experience with consciousness being the main subject matter.

**Psychology – The Science of Experience**

Titchner (1968), the leader of the structuralists defines psychology as the science of conscious experience which is dependent upon the experiencing person.

**Psychology – Study of Behaviour**

*Psychology* is the science of the mind and behavior. The word "psychology" comes from the Greek word psyche meaning "breath, spirit, soul", and the Greek word *logia* meaning the study of something.

**Educational psychology**

Educational psychology is the branch of psychology studies educational setting and interventions. *Psychologists* experiment with the dimensions of teaching and social psychology applied within schools and colleges. Educational psychology influences teaching methods and general practices in and around the campus. Educational Psychology is the study of how humans learn in educational settings, the effectiveness of educational interventions, the psychology of teaching, and the social psychology of schools as organizations.

Educational psychology involves the study of how people learn, including topics such as student outcomes, the instructional process, individual differences in learning, gifted learners and learning disabilities.
**Nature of Educational Psychology**

Educational Psychology by its very nature is treated as a science. Like science it employs different objective methods of data collection, experiments and drawing inferences. It deals with the study of an organized and systematic body of knowledge concerning human behavior of all kinds. It seeks to make its subject matter scientific and exact by utilizing special means and appliances. It also aims at understanding, explaining, predicating and controlling facts and phenomena relating to human behavior.

**(1) Educational Psychology - a Social Science**

Educational psychology is a social science. Like any other social science it studies human beings relating to education. Like the economist, political scientist, sociologist or anthropologist, the educational psychologist conducts investigations and experiments, collects data and statistics, and makes interpretations and inferences. He does not work in an ivory tower nor makes any arm-chair speculations.

**(2) Educational Psychology - an Applied Science**

Educational psychology is an applied science. It applies the psychological principles and methods in the field of education. The knowledge about the
growth and development of the child, learning conditions and theories belonging to the field of psychology is used for methods of teaching and school organization.

(3) Educational Psychology - a Positive Science

Educational psychology is a positive science which deals with things as they are. It is not a normative science which deals with things as should be. It studies the child's growth and development as they are. It never deals with what the child should do or should not do. This task is taken care of by ethics and philosophy which are normative sciences.

Scope of Educational Psychology

Educational psychology is psychology in relation to education. It deals with the behavior of the individual in various educational environments. Psychology studies the behavior of the individual in different conditions and situations. Therefore, scope of general psychology is broader than that of educational psychology, which is comparatively limited.

Educational psychology deals with the child as a whole-his physical, mental, emotional and social development at various stages. Such development is resulted by heredity and environment, different biological, social and cultural
factors. Hence all these aspect and factors come under the purview of educational psychology.

Learning is the key-concept in educational psychology. It is so important and broad-based that educational psychology is also called learning psychology. The learning process, learning and maturation, nature and conditions of learning factors influencing; learning, motivation, attention and interest, various kinds of learning and laws of learning come under the scope of educational psychology.

The psychological principles underlying various methods of teaching, educational innovations and experiments, educational objectives, mental health and hygiene, special provisions for slow-learners, gifted, handicapped and deprived children are usefully applied to educational development. These are, therefore, part and parcel of educational psychology.

The psychological tools and techniques, methods and approaches are profitably used by the educational psychologists for undertaking research studies and experiments in various fields. New methods and techniques are also developed by them for collection, interpretation and analysis of data. All these constitute the scope of educational psychology.
The scope of educational psychology is securing greater and greater importance in the field of education. Educational psychology is the combination of two i.e. Educational and Psychology. So educational psychology is the study of behavior of the teacher, taught and persons connected to educational environment. Educational psychology is, therefore, that branch of educational content, which deals with human behavior and its modification.

**PREDICTORS: A THEORETICAL APPROACH**

**Meaning**

The new International Webster’s Comprehensive Dictionary explain it as ‘one who or that which predicts’.

It is information that supports a probabilistic estimate of future events (Wikipedia).

**Predictor may refer to:**

- a *predictor variable*, also known as an independent variable
- the Kerrison Predictor, a military fire-control computer
- something which makes a prediction
a branch predictor, a part of many modern processors

To foretell something

There are various meanings such as predict, call, forecast, foretell, prognosticate.

Predictors-Definitions:

One who predicts or foretells; one who prophesies- Century Dictionary and Encyclopedia

Something that anticipates, predicts or foretells- Wiktionary

One who predicts; a foreteller- (GNU Webster's 1913)

someone who makes predictions of the future (usually on the basis of special knowledge)

a computer for controlling antiaircraft fire that computes the position of an aircraft at the instant of a shell's arrival

information that supports a probabilistic estimate of future events

a computer for controlling antiaircraft fire that computes the position of an aircraft at the instant of a shell's arrival

information that supports a probabilistic(word net 0.3)

For Example:
1. People assume that the astrologist can predict future events.

2. It's hard to predict when the rain will come.

3. Many people predicted that the business would be done well but it fails.

4. Sales are predicted to be the same as last year in a shop.

**PSYCHOLOGICAL VARIABLES**

There are more psychological variables may predict the achievement of students. They are:

1. Heredity and Environment
2. Physical Growth and Development
3. Interest
4. Emotions
5. Intellectual Development
6. Development of Language and Communication
7. Individual Differences
8. Learning
9. Motivation and Frustration
10. Attention and Interest
11. Thinking and reasoning
12. Knowledge and understanding
13. Memory and forgetting
14. Imagination
15. Intelligence
16. Personality
17. Creativity
18. Mental health
19. Attitude
20. Aptitude
21. Rewards and Punishments

**SOCIAL VARIABLES:**

There are more variables in the society which may predict the achievement of the students. They are given below:

1. Sex

2. Religion

3. Marital Status

4. Educational Qualifications

5. Years of Teaching experience
6. Father’s Education
7. Mother’s Education
8. Father’s occupation
9. Mother’s occupation
10. Type of family
11. Size of family
12. College locality
13. Nature of college
14. Type of College Management
15. Medium of instruction
16. Study practice

SOCIO-PSYCHOLOGICAL VARIABLES

Socio-psychology- Meaning
In the New College Encyclopedia, it was illustrated as it is an academic discipline that studies the social behavior of human beings in terms of both individuals and social influences.

In the Dictionary of Education Sudha Malhotra explains, it deals with the study of social behavior through a study of people in their social relationships with others and through studying the person’s individual socialization.

It deals with the study of social behavior through a study of people in their social relationships with others and through studying the person and socialization.

An attempt to understand and explain how the thoughts, feelings and behaviour of individuals are influenced by the imagined or implied presence of others Allport, (1985) The best known social –psychological theories of ethics and racial inequality are the frustration, aggression, projection and authoritarian personality theories. All of these see the origins of prejudice in individual psychological orientations toward members of art-groups, but they differ in important ways.

An academic discipline that studies the social behavior of human beings in terms of both individual and social influences. There are many socio
psychological variables may predict the achievement of B.Ed Mathematics students. From which some have been selected.

They are:

1. Scientific Temper
2. Self-concept
3. Attitude
4. General anxiety
5. Rigidity-Flexibility
6. Independence-Dependence
7. Gender
8. Perception on Peers’ Treatment
9. Perception on Teachers’ Treatment
10. Perception on Parents’ Treatment
11. Part-Time work
12. Higher Secondary Instructional Medium
13. Family Type
14. Family Size
15. Parents’ occupation
16. Parents’ Income
17. Residence
18. College Management
19. College locality
20. Course System
21. Class strength
22. Assignments
23. Records
24. Library beyond working Hours
25. Aptitude
26. Intelligence
27. Personality
28. Anxiety
29. Frustration
30. Helping tendency
31. Motivation
32. Learning
SOCIO-PSYCHOLOGICAL VARIABLES- A PRACTICAL APPROACH

INDIAN STUDIES

Socio-psychological variables

Lindzey and Urdan (1954) related measures of security, dominance, happiness, and achievement derived from reflatings, questionaries and a sentence- completion test to various sociometric measures including sociometric status and clique structure.

Meenakshi Sundaram (1991), illustrated socio-psychological variables-referred the tern variables, viz scientific temper, Extroversion-Introversion, self-concept, Attitude towards caste system, General Anxiety, Rigidity, flexibility, Independence –Dependence, Feminity–masculinity, political participation and Happiness which are treated as Independent variables in his study.

Foreign studies:

E.Dianne looker (1983) from Acadia University and Peter C.Pineo from McMaster university suggested that a small but persistent incidence of sons with occupational statuses closely resembling those of many industrialized nations in Socio psychological variables and their relevance to the status attainment of Teenagers.

Goolsby, Charles. B (1987) extended concepts from organizational behavior theory and applies them to a process of international manpower management.

Metha, Asha (1988) studied that the psychological and social factors were not significantly related to the teacher’s educational output.

An attempt to understand and explain how the thoughts, feelings and behaviour of individuals are influenced by the imagined or implied presence of others (Allport, 1985).
Social psychology is the study of what effects groups have on individuals, and how being a part of a group or, in a widen sense, a society, effects a person’s thinking, feelings and behaviour.

Some of the major topics covered in social psychology include the study of social influence which covers conformance, obedience, and compliance (Baron & Byrne, 2004 chap.8) Social cognition (Myers, 2000, Chap.5) group dynamics such as polarization, leadership, and decision making process (Sabini 1995, chap.3); attitude formation and attitude change (Tyler, Peplau and Leng 1997, Chap.5 and 6); and aggression (Aronson, 2003).

Hing Kerug MA (2003) Academic achievement, family social environment are associated positively with prosocial behavior.

I Sao ohsawa & others (2003) concluded that patients have socio-psychological problems of 13.

Gayle Holmes Payne (2005) examined three social variables associated with education (social origin, social, support, and social-psychological resources)
to see how they play a role in student well being (physical well-being, psychological well-being, ad health life styles.

C.H.Wiefferink, S.B.Detman (2007) showed in his study that most of the determinants included in our frame work significantly correlated with the intention to use performance-enhancing drugs.

Rothon Catherine.et.al.(2011) in Social Psychology of Education: An International Journal educational aspirations had a strong association with actual achievement at age 16, remaining associated even after controlling for a number of other variables, including prior achievement. These findings are discussed in light of previous research and potential intervention strategies.

Thomas M.H.Efferman (2005) in his study,A students Guide to studying Psychology, psychology the religion is not a predictor of science achievement (Khatoon,1996; Neatheory,1997). Muslims performe with as much success on the science test as the non-muslims.

Sajjan Chhillar explained that the teachers’ behavior should be impartial and should pay complete attention towards poor students. He should solve their problems sympathetically and if possible separate classes should be arranged for backward students.
The teacher should pay special attention to backward students they should not be criticized. Special classes should be arranged to help them. The parents should not compare their children’s achievement from highly intelligence is an inborn ability.

Attitude of parents and teachers towards the children should be sympathetic and co-operative. They must provide congenial environment at home and schools.

THE IMPORTANCE OF MATHEMATICS:

Mathematics should be virtualized as the vehicle to prepare a child to think, reason, analyze and articulate logically, although over the part few decades efforts have been made to improve the present status of mathematics. (Edutrack 2006).

- How we can think of school mathematics.

  School Mathematics can be referred to as:
  - A body of knowledge to be learned
  - A set of techniques for solving problem
  - The study of certain structures eg. Arithmetic, Algebra, Geometric etc.
  - A language with a given system of signs.
  - A formal science with a highly formalized language.
A collection of procedures for carrying out practical classification, predict, count etc.

Recent trends in Mathematics:

Pamela Cowan explained that using MS Word is the Maths lesson, for example, consider the kite shaper created from right-angled lines in Auto shapes Basic shapes, and the Rotate flip options in Draw.

Teachers can create a Maths quiz using PowerPoint to test the pupils' ability to recognize shapes when the properties are listed.

Another package from Black Cat software is NumberBox2, using the pupils can analyse and interpret existing data or enter their own data.

Maths has its own language and symbolism of the symbols. Leinday (1978) stated that Maths is the language to Physical Science and certainly no marvelous language was ever created by the mind of man.

Some of the symbols commonly used in Mathematics are:

= is equal to

< less than

> greater than
≠ is not equal to

∥ Parallel to

≡ Congruent to

∪ Universal set

∑ summation (sigma)

{ } Null set

R Set of reals

∈ Belongs to

ar (A) area of A

L(AB) length of AB

vol (B) Volume of B

M or X mean of raw data

> is greater than or equal to

< is less than or equal to

O Circle
In addition to these we use $+$, $-$, $\times$, $\div$ for addition, subtraction, multiplication and division respectively.

In almost all the symbols, there is logic, brevity, precision, beauty etc. of the Mathematical Language.

**ATTITUDE- A THEORETICAL APPROACH**

**Attitude-Meaning & Definitions:**

According to the Merriam Webster dictionary the definition of attitude is:

"A mental position with regard to a fact or state; a feeling or emotion toward a fact or state."

Four major **components** of attitude are (1) Affective: emotions or feelings. (2) **Cognitive**: belief or **opinions held** consciously. (3) Conative: inclination for action. (4) Evaluative: positive

An **attitude** is a hypothetical construct that represents an individual's degree of like or dislike for an item. Attitudes are generally positive or negative views of a person, place, thing, or event-- this is often referred to as the attitude
Attitudes are judgments. They develop on the ABC model (affect, behavior, and cognition). The affective response is an emotional response that expresses an individual's degree of preference for an entity. The behavioral intention is a verbal indication or typical behavioral tendency of an individual. The cognitive response is a cognitive evaluation of the entity that constitutes an individual's beliefs about the object. Most attitudes are the result of either direct experience or observational learning from the environment.

Attitude Formation

Unlike personality, attitudes are expected to change as a function of experience. Tesser (1993) has argued that hereditary variables may affect attitudes - but believes that they may do so indirectly. For example, if one inherits the disposition to become an extrovert, this may affect one's attitude to certain styles of music. There are numerous theories of attitude formation and attitude change. These include: Consistency theories, what imply that we must be consistent in our beliefs and values. The most famous example of such a theory is Dissonance-reduction.
theory, associated with Leon Festinger, although there are others, such as the balance theory of Fritz Heider.

- **Self-perception theory**, associated with Daryl Bem
- **Persuasion**
- **Social judgment theory**
- **Balance theory**

**Attitude Change**

Attitudes can be changed through persuasion. The celebrated work of Carl Hovland, at Yale University in the 1950s and 1960s, helped to advance knowledge of persuasion. In Hovland's view, we should understand attitude change as a response to communication. He and his colleagues did experimental research into the factors that can affect the persuasiveness of a message:

1. Target Characteristics: These are characteristics that refer to the person who receives and processes a message. One such trait is intelligence - it seems that more intelligent people are less easily persuaded by one-sided messages. Another variable that has been studied in this category is self-
esteem. Although it is sometimes thought that those higher in self-esteem are less easily persuaded, there is some evidence that the relationship between self-esteem and persuasibility is actually curvilinear, with people of moderate self-esteem being more easily persuaded than both those of high and low self-esteem levels (Rhodes & Woods, 1992). The mind frame and mood of the target also plays a role in this process.

2. Source Characteristics: The major source characteristics are expertise, trustworthiness and interpersonal attraction or attractiveness. The credibility of a perceived message has been found to be a key variable here (Hovland & Weiss, 1951); if one reads a report about health and believes it came from a professional medical journal, one may be more easily persuaded than if one believes it is from a popular newspaper. Some psychologists have debated whether this is a long-lasting effect and Hovland and Weiss (1951) found the effect of telling people that a message came from a credible source disappeared after several weeks (the so-called "sleeper effect"). Whether there is a sleeper effect is controversial.

Received wisdom is that if people are informed of the source of a message before hearing it, there is less likelihood of a sleeper effect than if they are told a message and then told its source.
3. Message Characteristics: The nature of the message plays a role in persuasion. Sometimes presenting both sides of a story is useful to help change attitudes.

Cognitive Routes: A message can appeal to an individual's cognitive evaluation to help change an attitude. In the central route to persuasion the individual is presented with the data and motivated to evaluate the data and arrive at an attitude changing conclusion. In the peripheral route to attitude change, the individual is encouraged to not look at the content but at the source. This is commonly seen in modern advertisements that feature celebrities. In some cases, physician, doctors or experts are used. In other cases film stars are used for their attractiveness.

**Emotion and Attitude Change**

Emotion is a common component in persuasion, social influence, and attitude change. Much of attitude research emphasized the importance of affective or emotion components (Breckler & Wiggins, 1992). Emotion works hand-in-hand with the cognitive process, or the way we think, about an issue or situation. Emotional appeals are commonly found in advertising, health campaigns and political messages. Recent examples include no-smoking health campaigns and political campaign advertising emphasizing the fear of terrorism.
Taking into consideration current attitude research, Breckler and Wiggins (1992) define attitudes as “mental and neural representations, organized through experience, exerting a directive or dynamic influence on behavior” (p. 409). Attitudes and attitude objects are functions of cognitive, affective and conative components. Attitudes are part of the brain’s associative networks, the spider-like structures residing in long term memory (Higgins, 1986) that consist of affective and cognitive nodes linked through associative pathways (Anderson, 1983; Fazio, 1986). These nodes contain affective, cognitive, and behavioral components (Eagly & Chaiken, 1995).

Anderson (1983) suggests that the inter-structural composition of an associative network can be altered by the activation of a single node. Thus, by activating an affective or emotion node, attitude change may be possible, though affective and cognitive components tend to be intertwined. In primarily affective networks, it is more difficult to produce cognitive counterarguments in the resistance to persuasion and attitude change (Eagly & Chaiken, 1995).

Affective forecasting, otherwise known as intuition or the prediction of emotion, also impacts attitude change. Research suggests that predicting emotions is an important component of decision making, in addition to the cognitive
processes (Loewenstein, 2007). How we feel about an outcome may override purely cognitive rationales.

In terms of research methodology, the challenge for researchers is measuring emotion and subsequent impacts on attitude. Since we cannot see into the brain, various models and measurement tools have been constructed to obtain emotion and attitude information. Measures may include the use of physiological cues like facial expressions, vocal changes, and other body rate measures (Breckler & Wiggins, 1992). For instance, fear is associated with raised eyebrows, increased heart rate and increase body tension (Dillard, 1994). Other methods include concept or network mapping, and using primes or word cues (Shavelson & Stanton, 1975).

**Processing Models**

Some research on emotion and attitude change focuses on the way people process messages. Many dual process models are used to explain the affective (emotion) and cognitive processing and interpretations of messages. These include the elaboration likelihood model, the heuristic-systematic model, and the extended parallel process model.
In the Elaboration Likelihood Model, or ELM, (Petty and Cacioppo, 1986), cognitive processing is the central route and affective/emotion processing is often associated with the peripheral route. The central route pertains to an elaborate cognitive processing of information while the peripheral route relies on cues or feelings. The ELM suggests that true attitude change only happens through the central processing route that incorporates both cognitive and affective components as opposed to the more heuristics-based peripheral route. This suggests that motivation through emotion alone will not result in an attitude change.

In the Heuristic-Systematic Model, or HSM, (Chaiken, Liberman, & Eagly, 1989) information is either processed in a high-involvement and high-effort systematic way, or information is processed through shortcuts known as heuristics. Emotions, feelings and gut-feeling reactions are often used as shortcuts.

The Extended Parallel Process Model or EPPM, includes both thinking and feeling in conjunction with threat and fear appeals (Witte, 1992). EPPM suggests that persuasive fear appeals work best when people have high involvement and high efficacy. In other words, fear appeals are most effective when an individual cares about the issue or situation, and that individual possesses and perceives that they possess the agency to deal with that issue or situation.
Components of Emotion Appeals

Any discrete emotion can be used in a persuasive appeal; this may include jealousy, disgust, indignation, fear, and anger. Fear is one of the most studied emotional appeals in communication and social influence research. Dillard (1994) suggests that “fear appeals have been thought of as messages that attempt to achieve opinion change by establishing the negative consequences of failing to agree with the advocated position” (p. 295).

Important consequences of fear appeals and other emotion appeals include the possibility of reactance (Brehm & Brehm, 1981) which may lead to either message rejections or source rejection and the absence of attitude change. As the EPPM suggests, there is an optimal emotion level in motivating attitude change. If there is not enough motivation, an attitude will not change; if the emotional appeal is overdone, the motivation can be paralyzed thereby preventing attitude change.

Emotions perceived as negative or containing threat are often studied more than perceived positive emotions like humor. Though the inner-workings of humor are not agreed upon, humor appeals may work by creating incongruities in the mind (Maase, Fink & Kaplowitz, 1984). Recent research has looked at the impact of humor on the processing of political messages (Nabi, Moyer-Guse, & Byrne,
2007). While evidence is inconclusive, there appears to be potential for targeted attitude change is receivers with low political message involvement.

Important factors that influence the impact of emotion appeals include self efficacy, attitude accessibility, issue involvement, and message/source features. Self efficacy is a perception of one’s own human agency; in other words, it is the perception of our own ability to deal with a situation (Bandura, 1992). It is an important variable in emotion appeal messages because it dictates a person’s ability to deal with both the emotion and the situation. For example, if a person is not self-efficacious about their ability to impact the global environment, they are not likely to change their attitude or behavior about global warming.

Dillard (1994) suggests that message features such as source non-verbal communication, message content, and receiver differences can impact the emotion impact of fear appeals. The characteristics of a message are important because one message can elicit different levels of emotion for different people. Thus, in terms of emotion appeals messages, one size does not fit all.

Attitude accessibility refers to the activation of an attitude from memory (Fazio, 1986); in other words, how readily available is an attitude about an object, issue, or situation. Issue involvement (Zaichkowsky, 1985) is the relevance and salience of an issue or situation to an individual. Issue involvement has been
correlated with both attitude access and attitude strength. Past studies conclude accessible attitudes are more resistant to change (Fazio & Williams, 1986).

**Implicit and Explicit Attitudes**

There is also considerable research on implicit attitudes, which are generally unacknowledged or outside of awareness, but have effects that are measurable through sophisticated methods using people's response times to stimuli. Implicit and explicit attitudes seem to affect people's behavior, though in different ways. They tend not to be strongly associated with each other, although in some cases they are. The relationship between them is poorly understood.

**Jung's Definition**

Jung's definition of attitude is a "readiness of the psyche to act or react in a certain way" (Jung, [1921] 1971:par. 687). Attitudes very often come in pairs, one conscious and the other unconscious. Within this broad definition Jung defines several attitudes. The main attitude dualities that Jung defines are the following:

- Consciousness and the Unconscious. The "presence of two attitudes is extremely frequent, one conscious and the other unconscious. This means that consciousness has a constellation of contents different from that of
the unconscious, a duality particularly evident in neurosis" (Jung, [1921] 1971: par. 687).

- Extraversion and Introversion. This pair is so elementary to Jung's theory of types that he labeled them the "attitude-types".


- The rational attitude subdivides into the thinking and feeling psychological functions, each with its attitude.

- The irrational attitude subdivides into the sensing and intuition psychological functions, each with its attitude. "There is thus a typical thinking, feeling, sensation, and intuitive attitude" (Jung, [1921] 1971: par. 691).

- Individual and Social Attitudes. Many of the latter are "isms".

ATTITUDE – A PRACTICAL APPROACH:

Hodges, Charles B.; Kim, ChanMin. (2012) did a study on Improving College Students' Attitudes toward Mathematics. The major findings of this study are as follows:
This study was conducted to investigate the effectiveness of a treatment designed to improve college algebra students' attitudes toward mathematics. Keller's ARCS motivational design model was used as a guiding framework for the development of a motivational video which was delivered online. The application of motivational design to improve mathematics attitudes in an online environment extends the use of motivational design. A pre test-post test control group design was used to test the effectiveness of the treatment. The participants in this study were 43 students enrolled in a college algebra course offered at a large state university in the mid-Atlantic region of the United States. Statistically significant results were observed for improved attitudes toward mathematics.

Fullerton, Jami A.; Kendrick, Alice (2011) did a study on *The Math Problem: Advertising Students' Attitudes toward Statistics*. The major findings of this study are as follows:

This study used the Students' Attitudes toward Statistics Scale (STATS) to measure attitude toward statistics among a national sample of advertising students. A factor analysis revealed four underlying factors make up the attitude toward statistics construct--"Interest & Future Applicability," "Confidence," "Statistical Tools," and "Initiative." Advertising students' attitudes toward
statistics were shown to be more positive than negative. Students in this study were most positive about the use of Statistical Tools and displayed attitudes well above neutral on Interest and Future Applicability and Initiative. Confidence received the lowest evaluation. Advertising students who were drawn to the major because of its creative aspects had significantly weaker attitudes toward statistics than did those who came to study advertising because of the business aspects. Strategies for improving negative attitudes toward statistics in advertising courses are discussed.

Brown, Clayton D. (2010) did a study on The Effects of Requiring Study Group Participation Associated with Students' Attitudes and Achievements in Developmental Math. The major findings of this study are as follows:

It is widely publicized that student attitudes and achievement in math in the United States require improvement. U.S. students have shown lackluster mathematics achievement scores compared to their international peers in other developed countries. As a former high school math instructor, this author observed that the attitude of many high school students and their parents was that the student should do as much math as possible in high school in hopes of "testing-out" of college math so as to "never have to take math again." One study
found that math serves as a "critical filter" for many students in determining their educational, occupational, and professional opportunities. Both high school and college students are showing evidence of being math avoiders, and this closes numerous doors of opportunity for too many students. Many teachers and students have found success in combating math anxiety, doubts about personal ability, and math avoidance by facilitating and participating in student study groups inside and outside of the classroom. Study groups help address many of the deficiencies of traditional learning methods and provide advantages to both students and teachers. Despite research showing the benefits of study groups, research has not focused on the effects of "requiring" student participation in study groups outside of class. Because of the many suggested benefits, the author wished to determine if the positive results occurred when student participation in study groups was required in developmental math classes at Utah Valley University (UVU). The results of his study indicated no statistically significant difference in either attitude or performance between students required to participate in study groups versus those for whom participation was not required.
Perry, Christine A. (2011) did a study on *Motivation and Attitude of Preservice Elementary Teachers toward Mathematics*. The major findings of this study are as follows:

This study investigated preservice elementary teachers' achievement goal orientations for learning mathematics and the relationship of those goals to their attitudes toward mathematics. Self-report instruments were administered to assess three achievement goals—mastery, performance-approach, and performance-avoid, and three constructs of attitude—confidence in learning mathematics, usefulness of mathematics, and mathematics as a male domain. The preservice teachers were higher in mastery goals than in performance goals, and performance-avoid goals were higher than performance-approach goals. Mastery goals correlated positively to all three constructs of attitude. Since mathematics classes are traditionally performance-oriented, these results suggest a mismatch between personal and classroom goals that could result in negative attitudes and the adoption of maladaptive performance-avoid goals. These findings suggest that mathematics content courses for preservice elementary teachers should be taught in a classroom climate that supports and encourages mastery goals.
Berlin, Donna F.; White, Arthur L. (2009) did a study on *A Longitudinal Look at Attitudes and Perceptions Related to the Integration of Mathematics, Science, and Technology Education*. The major findings of this study are as follows:

The purpose of this study is to provide an in-depth analysis of attitudes and perceptions related to the integration of mathematics, science, and technology education of pre-service teachers preparing to teach STEM disciplines. Longitudinal data by individual cohort and across seven years of the Integrated Mathematics, Science, and Technology (MSAT) Program are reported, analyzed, and interpreted to help design and improve pre-service teacher education programs and improve teaching and learning in STEM classrooms. Results of quantitative analyses indicate that there was generally no change in pre-service teacher attitudes and perceptions related to the value of the integration of mathematics, science, and technology education--they clearly valued integration at the onset and at the completion of the program. However, there was a significant change in pre-service teacher attitudes and perceptions related to integration feasibility in terms of inefficiency and difficulty. Implications for teacher education programs include: (a) more exposure to concepts, processes, and skills in STEM that are similar, analogous, complementary, or synergistic; (b) familiarity with instructional strategies and access to resources; (c) deeper
understanding of content across STEM; and (d) strategies for collaboration and team work to make integrated instruction time more efficient and less difficult to manage.

An, Song A.; Ma, Tingting; Capraro, Mary Margaret (2008) did a study on Pre service Teachers' Beliefs and Attitude about Teaching and Learning Mathematics through Music: An Intervention Study. The major findings of this study are as follows:

This study presents exploratory research investigating the integration of music and a mathematics lesson as an intervention to promote pre service teachers' attitude and confidence and to extend their beliefs toward teaching mathematics integrated with music. Thirty students were randomly selected from 64 pre service teachers in a southern university. A 90-minute mathematics lesson integrated with a music composition activity was taught by the first author. Pre- and post questionnaires were provided to evaluate the change in pre service teachers' attitude and beliefs toward mathematics. The results demonstrated that the mathematics lesson integrated with music had a positive effect on preservice teachers' attitude and beliefs toward mathematics teaching and learning.
Kaldo, Indrek; Reiska, Priit Estonian (2008) did a study on *Science and Non-Science Students' Attitudes towards Mathematics at University Level*. The major findings of this study are as follows:

This study investigates the attitudes and beliefs towards studying mathematics by university level students. A total of 970 randomly chosen, first year, Estonian bachelor students participated in the study (of which 498 were science students). Data were collected using a Likert-type scale questionnaire and analysed with a respect to field of study (science and non-science). Results of this study show that science students have a more positive attitude towards mathematics.

Akbulut, Omer Engin; Karakus, Fatih (2007) did a study on *The Investigation of Secondary School Science and Mathematics Pre-Service Teachers' Attitudes towards Teaching Profession*. The major findings of this study are as follows:

The purpose of this study was to determine how pedagogical content courses taken during teacher education programs affect the pre-service teachers' attitudes toward teaching profession. 239 secondary school science and Mathematics (Physics, Chemistry, Biology, Mathematics) pre-service teachers participated in the study and "Teaching Professional Attitude Scale" was used to
collect data. The data was analyzed by using t-test for binary comparisons; the one-way analysis of variance (ANOVA) and Tukey HSD test for multiple comparisons. The findings revealed that pre-service teachers' attitudes toward teaching profession were positive. However, the attitude scores of the pre-service teachers who are studied to content courses, decreased at the end of the pedagogical content courses.

Bishop, Amy Renee (2007) did a study on *The Effect of a Math Emporium Course Redesign in Developmental and Introductory Mathematics Courses on Student Achievement and Students' Attitudes toward Mathematics at a Two-Year College*. The major findings of this study are as follows:

The purpose of this research was to determine the effect of computer-based instruction on student mathematics achievement and students' attitudes toward mathematics in developmental and introductory mathematics courses, namely Elementary Algebra, Intermediate Algebra, and College Algebra, at a community college. The researcher also examined the relationship between attitudes and achievement. The sample consisted of 112 students, and the study was conducted during the Spring 2010 semester at a community college in south Mississippi. The participants were enrolled in one of six classes taught by the
researcher. The control group consisted of three classes (one Intermediate and two College Algebra sections) taught using traditional lecture instruction. The treatment group was comprised of three classes (one Beginning, one Intermediate, and one College Algebra section) that were taught using computer-based instruction via the interactive online software MathXL. Both the control and treatment groups were taught the same objectives and received instruction two days a week for 75 minutes per day. Mathematics achievement was measured by a comprehensive final examination that served as a pre-test and post-test. Achievement data were collected prior to any treatment and at the end of the study. Students' attitudes toward mathematics were measured both pre-survey and post-survey using the Attitudes Toward Mathematics Inventory (ATMI). Analyses of Covariance (ANCOVA) were used to determine whether there were significant differences in attitudes in the control and treatment groups and significant differences in achievement in the control and treatment groups, while controlling for pre-ATMI survey and pre-test scores. A correlation was used to determine whether there was a significant relationship between student achievement in mathematics and students' attitudes toward mathematics. Results of the statistical analysis on pre- and post-ATMI surveys indicated a statistically significant difference in students' attitudes
toward mathematics between the control and treatment groups. Students in the traditional lecture group had significantly higher attitudes than students in the computer-based classes. ANCOVA results of the pre- and post-tests showed no significant difference in achievement between the control and treatment groups. Results of the correlation showed a significant relationship between attitude and achievement in the traditional lecture control group.

Dogan, Mustafa (2007) did a study on Primary Trainee Teachers' Attitudes to and Use of Computer and Technology in Mathematics: The Case of Turkey. The major findings of this study are as follows:

This study explores Turkish primary mathematics trainee teachers' attitudes to computer and technology. A survey was conducted with a self constructed questionnaire. Piloting, factor and reliability ([alpha] = 0.94) analyses were performed. The final version of the questionnaire has three parts with a total of 48 questions including a Likert type attitude scale which contains 39 statements. The sample is a total of 361 students from the primary mathematics teacher training department in two different universities. The study found that the trainee teachers, in general, are positive towards computer use in mathematics with adequate level of attitudes, and usually express positive feelings about computer
and information technology. These perceptions are not gender related as well. The study concludes that the need for training in computer and information technology competency in mathematics remains important, and that such programme needs to be specifically customized to account for the wide range of experiences and attitudes of trainee teachers.

Griffith, James D.; Adams, Lea T.; Gu, Lucy L.; Hart, Christian L. (2007) did a study on Students' Attitudes toward Statistics across the Disciplines: A Mixed-Methods Approach. The major findings of this study are as follows:

Students' attitudes toward statistics were investigated using a mixed-methods approach including a discovery-oriented qualitative methodology among 684 undergraduate students across business, criminal justice, and psychology majors where at least one course in statistics was required. Students were asked about their attitudes toward statistics and the reasons for their attitudes. Five categories resulted for those with positive and negative attitudes and were separated on the basis of discipline. Approximately 63 per cent of students indicated a positive attitude toward statistics. Business majors were most positive and were more likely to believe statistics would be used in their future career.
Multiple methodological approaches have now provided data on the various domains of attitudes toward statistics and those implications are discussed.

Pilgrim, Mary E. (2012) did a study on *A Concepts for Calculus Intervention: Measuring Student Attitudes toward Mathematics and Achievement in Calculus.* The major findings of this study are as follows:

Data indicate that about 40 percent of students initially enrolled in MATH 160: Calculus for Physical Scientists I finish the course with a grade of D or F, dropped, or withdrew from the course (Reinholz, 2009). The high failure rate led to an intervention course (MATH 180) for students at risk of failing MATH 160. At-risk students were identified based on their calculus exam one scores. This dissertation reports on the effect of MATH 180 during the fall 2009 semester on both student achievement in MATH 160 and math attitude. Students identified as being at-risk of failing MATH 160 were invited to drop MATH 160 and enroll in MATH 180. Not all students that were invited accepted the invitation. After completing MATH 180 during the fall 2009 semester, students then had the option to enroll in MATH 160 for the spring 2010 semester. MATH 180 students exhibited improvement in exam one scores. From the fall 2009 semester to the spring 2010 semester students raised their exam one scores by one-half of a
standard deviation. Although MATH 180 students showed improvement in MATH 160 during the spring 2010 semester, there were no overall significant differences in achievement between students that took MATH 180 and those that did not. Qualitative analysis indicated that MATH 180 students came to understand that calculus problems could be solved using multiple strategies, but they did not always know what those strategies were. In class it was hard at first to understand the direction it was going but it was helpful to try to think at math differently than I have been taught all my life. Math attitude was measured using the Modified Indiana Mathematics Belief Scales (MIMBS). MIMBS scores improved for students that took MATH 180, but there were no significant differences between MATH 180 students and non-MATH 180 students. There were significant correlations between constructs measured by the MIMBS and final course grade in MATH 160. Despite there being no significant differences in academic performance, trends in the data indicate higher final exam scores and course grades for students in the intervention group.

Uyangor, Sevinc Mert; Ece, Denizhan Karaca (2007) did a study on *The Attitudes of the Prospective Mathematics Teachers towards Instructional Technologies and Material Development Course*. The major findings of this study are as follows:
This study aims to determine the attitudes of prospective teachers of Secondary Mathematics Education toward Instructional Technologies and Material Development (ITMD) Course. The participants of this descriptive research include 44 students, who take ITMD Course at Department of Secondary Mathematics at Necatibey Faculty of Education in Balikesir University. The questionnaire developed by researchers was conducted before and after the course at 2007-2008 fall semesters. The accuracy of the difference in the attitudes of the prospective math teachers before and after the course was tested by t test and it was seen to be statically significant in the level of p=0.05. Moreover, according to results of the interviews, the prospective teachers emphasized that ITMD Course aims to provide permanent learning and to prepare materials that are appropriate to the teaching methods through an effective teaching process. At the end of the semester, the attitudes of the prospective teachers toward the course developed in a positive way. Besides, it was observed that the instructor's positive attitudes toward the course, and group works contributed both to that development and to the success of the prospective teachers in the teaching and learning activities.
Lim, L. L.; Tso, T. -Y.; Lin, F. L. (2006) did a study on Assessing Science Students' Attitudes to Mathematics: A Case Study on a Modelling Project with Mathematical Software. The major findings of this study are as follows:

This study reports the attitudes of students towards mathematics after they had participated in an applied mathematical modelling project that was part of an Applied Mathematics course. The students were majoring in Earth Science at the National Taiwan Normal University. Twenty-six students took part in the project. It was the first time a mathematical modelling project had been incorporated into the Applied Mathematics course for such students at this University. This was also the first time the students experienced applied mathematical modelling and used the mathematical software. The main aim of this modelling project was to assess whether the students' attitudes toward mathematics changed after participating in the project. We used two questionnaires and interviews to assess the students. The results were encouraging especially the attitude of enjoyment. Hence the approach of the modelling project seems to be an effective method for Earth Science students.
Malik, Qaiser Hameed (2006) did a study on *Measurement of Student Attitudes in First Year Engineering--A Mixed Methods Approach*. The major findings of this study are as follows:

This research study focused on freshman attitudes towards engineering in a newly implemented cornerstone sequence that emphasized holistic design experiences. The students' initial attitudes and changes in these attitudes were examined with the explanatory mixed methods approach that allows a sequential examination of the target population with two methods, using two sets of data, to investigate the treatment effects. In the quantitative phase, the study compared changes in freshman attitude towards engineering, between the new "design sequence" group (composed of freshmen in the cornerstone sequence) and the prior "traditional sequence" group (composed of all other freshmen), over the course of one semester. The data were collected in fall 2008 at two time intervals and changes in the two groups' attitudes were examined with repeated measures analysis of covariance models. The analyses reported here include data from 389 students out of the total population of 722 freshmen. The analyses revealed that engineering freshmen joined the program with positive or strongly positive attitudes towards engineering. Those strong attitudes were durable and resistant to change. Students in the design sequence group had higher ACT scores, enjoyed
math and science the most, and did not believe engineering to be an exact science. However, no appreciable time-group interaction was observed. To validate the quantitative results, an interview protocol was developed to investigate initial freshman attitudes and changes, if any, that took place as a result of the new cornerstone sequence. One-on-one interviews with a sample of ten students out of the population of 272 freshmen revealed that freshmen in the cornerstone sequence entered the program full of enthusiasm and idealism, and with strongly positive attitudes towards engineering. The strong motivational factors included parental/teacher influences, childhood motivations, and high school extra-curricular experiences. The participants appreciated the team work and problem solving aspects of engineering; however, they reported negative experiences in the cornerstone sequence. Interestingly, their overall perception about engineering was not affected by any of the negative experiences. The qualitative phase substantiated the belief that strong attitudes are harder to change; they are durable, they have impact, and they are not significantly affected by a short treatment. The results of this mixed methods study indicate that changing student attitudes may not be an easy task. One must develop a better understanding of student attitudes in order to improve understanding of the fine-grained details of curriculum and its implementation to be able to
develop more effective cornerstone design courses. Clearly, tight and focused quantitative studies complemented with a qualitative component provide a much broader and deeper insight into the learning that takes place in freshman courses. This research also documents the use of a longitudinal study to track the design sequence group and observe their performance in their junior and senior years. This would provide a better understanding of the long term effects of the new sequence.

Peker, Murat; Mirasyedioglu, Seref (2006) did a study on Pre-Service Elementary School Teachers' Learning Styles and Attitudes towards Mathematics. The major findings of this study are as follows:

The purpose of this study was to investigate the differences of pre-service elementary school teachers' attitudes towards mathematics according to their learning styles. Two hundreds eighty one pre-service elementary school teachers were involved in this study. The researchers employed two types of instruments, Learning Style Inventory and Scale of Mathematics Attitude Questionnaire, to collect the data. The learning style inventory was designed to detect the participants' learning styles, Divergent, Assimilator, Convergent, and Accommodator, and the scale of mathematics attitude questionnaire was used to
find the participants' attitudes towards mathematics. After the collection of the data, the researchers run the one-way ANOVA to show the attitude differences based on the learning styles. The study concluded that there were statistically significant differences found between the attitudes of learners, convergent and assimilator, and that the convergent learners had more positive attitudes towards mathematics than the assimilator learners.

Matthews, Michael E.; Seaman, Walter I. (2005) did a study on *The Effects of Different Undergraduate Mathematics Courses on the Content Knowledge and Attitude towards Mathematics of Preservice Elementary Teachers*. The major findings of this study are as follows:

Preservice elementary teachers have been shown to generally possess poor mathematical knowledge (e.g. Goulding, Rowland, & Barber, 2002) and also strong negative attitudes toward mathematics (e.g. MacNab & Payne, 2004). Recently, national organizations have proposed interventions to address these issues (Conference Board of the Mathematical Sciences, 2001). This paper analyzes the impact of a content course intervention. When compared to a control group, the experimental group had a significantly more positive attitude toward mathematics. When previous achievement was partially
controlled for, the experimental group scored significantly higher than the control group on a measure of content knowledge.

Lin, Cheng-Yao (2005) did a study on *A Study of Pre-Service Teachers' Attitudes about Computers and Mathematics Teaching: The Impact of Web-Based Instruction*. The major findings of this study are as follows:

This study explored the efficacy of web-based instruction in topics in elementary school mathematics in fostering teachers' confidence and competence in using instructional technology, and thereby promoting more positive attitudes toward using computers and Internet resources in the mathematics classroom. The results indicated that students who participated in the web-based instructions exhibited a significantly (p less than 0.05) better attitude toward using computers and web-based resources in teaching mathematics than did students in the control group.

Yenilmez, Kursat (2005) did a study on *Relationship among Learning Styles, Mathematics Attitude, and Anxiety for Students in Secondary School Teacher Training Institutes in Turkey*. The major findings of this study are as follows:
Students have different learning style strengths and preferences in the ways that they take in and process information. Some students tend to focus on facts, data, and algorithms; others are more comfortable with theories and mathematical models. Related to all of this and situated as the focus of this article is the fact that mathematics education in Turkey has many problems, including students' math anxiety and negative attitudes toward math, as well as a variety of student learning styles. Yet few studies have examined the learning and teaching of mathematics in Turkey. As such, this study focuses on the relationship among the learning styles, math anxieties, and math attitudes of the secondary school teacher training students. Examination of this relationship is needed for a higher-quality mathematics education. Participants included 408 students randomly chosen from four secondary school teacher training institutes during the first semester of the 2002-2003 academic year. Findings obtained from results of the research show that math anxiety and math attitude are efficient in predicting preferred learning styles of secondary school teacher students in learning mathematics.

Orhun, N. (2005) did a study on An Investigation into the Mathematics Achievement and Attitude towards Mathematics with Respect to
Learning Style According to Gender. The major findings of this study are as follows:

This study aimed to investigate whether there is a relationship between gender and learning style, mathematical achievement and attitude towards mathematics. The subjects of this study were 5th-semester students (42 females, 31 males) from the Mathematics Department at Anadolu University. The results of this study suggest that there were differences among learning modes preferred by female and male students, their mathematical achievements, and their attitudes towards mathematics. Mathematics achievement and attitude towards mathematics were not, themselves, dependent on gender. It was also noticed that while female students most preferred the Convergent learning style, male students most preferred the Assimilator learning style. No students were observed to prefer the Accommodator learning style in both groups.

Rule, Audrey C.; Harrell, Mary H. (2004) did a study on Symbolic Drawings Reveal Changes in Pre service Teacher Mathematics Attitudes after a Mathematics Methods Course. The major findings of this study are as follows:
A new method of analyzing mathematics attitudes through symbolic drawings, situated within the field of Jungian-oriented analytical psychology, was applied to 52 pre-service elementary teachers before and after a mathematics methods course. In this triangulation mixed methods design study, pre-test images related to past mathematics experiences drawn by prospective teachers were 63.2 per cent negative in tone, and listed associated emotions were 60.4 per cent negative; on the posttest these changed significantly to 72.1 per cent positive images, with 70.5 per cent positive associated emotions. The qualitative analysis of images and preservice teacher interpretations of them indicate that mathematics anxiety decreased and motivation changed from extrinsic to intrinsic as a result of the course. Pre-test images and interpretations focused primarily on grades, unhappiness, time and pressure, struggle, and lack of success. Post-test images and interpretations revealed (a) greater understanding of mathematical concepts through use of concrete materials; (b) greater engagement in mathematics through interesting activities and discourse with peers; and (c) a sense of accomplishment from teaching practicum lessons. Because the drawing exercise helped students connect with their previously unconscious images of mathematics, thereby helping to shift
the mathematics anxiety complex toward a more positive affective state, it is recommended that these activities be part of mathematics methods courses

White, Allan L.; Perry, Bob; Way, Jenni; Southwell, Beth (2004) did a study on Mathematical Attitudes, Beliefs and Achievement in Primary Pre-Service Mathematics Teacher Education. The major findings of this study are as follows:

This study reports on a study focused upon 83 pre-service primary teachers in their first mathematics pedagogy subject at the University of Western Sydney. They completed three surveys: an achievement test of the mathematics they would be expected to teach; a survey of their beliefs about mathematics, mathematics teaching and mathematics learning; and a survey of their attitudes towards mathematics. The experiences and beliefs of pre-service teachers influence the formation of attitudes and these, in turn, influence their classroom practices and beliefs. These beliefs, attitudes and practices may sometimes be at variance with the main direction of their tertiary teaching methods courses. Thus, it is crucial in assisting pre-service teachers to understand their own beliefs, attitudes and practices, and that these are made explicit and examined. This paper reports the data from the achievement test, belief survey and
the attitude survey, and investigates the relationships between these data. The results from this study show some connections, although relatively weak, among the three constructs and lead us to speculate on possible reasons for these.

Ocak, Mehmet A. (2000) did a study on *The Relationship between Gender and Students' Attitude and Experience of Using a Mathematical Software Program (MATLAB)*. The major findings of this study are as follows:

This correlation study examined the relationship between gender and the students' attitude and prior knowledge of using one of the mathematical software programs (MATLAB). Participants were selected from one community college, one state university and one private college. Students were volunteers from three Calculus I classrooms (one class from each school) in which MATLAB was used extensively. A survey regarding students' attitude and experience on using the MATLAB program was administered to classes. The findings of the study indicated that gender differences are not related to students' attitude and experience on the program. The results revealed slightly positive correlation between and students' attitude and experience on the program. The implications of this study shows that teachers who use MATLAB in their instruction and classroom practices must pay attention on how much students use it, the obstacles students had to
overcome to succeed in its use, and their general issues and concerns regarding MATLAB use.

Amato, Solange Amorim (1997) did a study on Improving Student Teachers' Attitudes to Mathematics. The major findings of this study are as follows:

The research results presented in this paper were part of an action research performed with the aims of improving primary school student teachers (STs)' understanding of, and attitudes to, mathematics. The teaching strategies used to help STs' improve their understanding and attitudes were similar to the ones suggested for their future use in teaching children. The data indicated that most STs improved their understanding. Some also said that they had improved their liking for the subject and their remarks clearly demonstrated a connection between the affective and cognitive domains. Yet others said that their attitudes towards mathematics had not changed much. The two main aims of this action research remain incompatible in the perception of some of these STs.

Kennedy, Robert L.; Broadston, Pamela M. (1997) did a study on Graduate Statistics: Student Attitudes. The major findings of this study are as follows:

This study investigated the attitudes toward statistics of graduate students who used a computer program as part of the instruction, which allowed for an
individualized, self-paced, student-centered, activity-based course. The twelve sections involved in this study were offered in the spring and fall 2001, spring and fall 2002, spring and fall 2003, and spring 2004 terms. There were 99 participants for whom there was complete data. All were enrolled in advanced statistics, with 70 females and 29 males. The study was a quasi-experimental pre test-post test design with both groups of students' being taught by the same instructor. The instrument used was the Statistics Attitude Survey (Roberts and Bilderback, 1980). The calculated chi square (244.10, p less than 0.0000005) and Cohen's w (0.19) indicated that there were differences in the distributions of ranks between pretest and posttest results. Most of these differences occurred as increases in the rankings marked at each end of the scales. That is, after the course, more students felt more strongly that they agreed or disagreed with statements about some aspects of statistics. For example, students agreed more strongly that "Statistics will be useful to me to test the superiority of one method over another." and "Statistics will be a useful way to help me improve the quality of my professional performance." On the other hand, they disagreed more strongly that "You should be good at math before attempting statistics" and "Statistics is too theoretical to be of much practical use to the average professional." Comments from open-ended evaluation forms may help explain the results of the survey:
"freedom to learn at my own pace and style", "class flexibility", "relaxed environment", and "I have learned a lot about stat and can apply it to my profession as a useful tool." It is concluded, then, that offering the course using computers may help improve students' attitudes about certain aspects of statistics. Cross Tabulation Report, Course information and schedule, and web site resources are included.

Machin, Matias Camacho; Rivero, Ramon Depool (1997) did a study on Students' Attitudes towards Mathematics and Computers When Using DERIVE in the Learning of Calculus Concepts. The major findings of this study are as follows:

Analyzes Likert attitude questionnaires given to 28 engineering students during their first semester at a Venezuelan university. Investigates the evolution of students' attitudes when in laboratory sessions using the DERIVE Computer Algebra System (CAS). Suggests that use of DERIVE symbolic calculus software has a positive influence on attitudes towards mathematics and the use of computers in mathematical learning.

Ring, Rochelle; Pape, Stephen J.; Tittle, Carol Kehr (1997) did a study on Student Attitudes in a Reformed Mathematics Classroom. The major findings of this study are as follows:
This study investigates changes in attitude using an adapted version of the Fennema-Sherman Mathematics Attitude Scales (F-S MAS). Writing samples, such as student math autobiographies, journals, and responses to mathematical problems, were collected, and student evaluations of teaching across semesters were reviewed. Over three semesters, a modified F-S MAS survey was administered to students in reform and non-reform sections. Pre- and post-course attitude scores were compared across groups. It is concluded that attitudes toward mathematics are based on long-term interactions with the subject and mathematics teachers; they take a long time to develop and are hard to change.

Gibson, Helen L.; Brewer, Lauren K.; Magnier, Jean-Marie; McDonald, James A. (1995) did a study on *The Impact of an Innovative User-Friendly Mathematics Program on Preservice Teachers’ Attitudes Toward Mathematics*. The major findings of this study are as follows:

This study gathered information about the impact of mathematics courses designed for paraeducators enrolled in an Urban Preservice Degree Articulation in Teacher Education (UPDATE) program. The goal was for paraeducators to complete mathematics courses with a passing grade, to
experience mathematics content using constructivist instructional approaches, and to improve their attitudes toward mathematics. During summer 1998, 22 UPDATE scholars enrolled in Algebra I, a precollege developmental mathematics course. After successfully completing this course, 21 of the paraeducators enrolled in Algebra II, another developmental course. During Fall 1998, 16 of the paraeducators who completed Algebra II enrolled in their first college-level mathematics course, Math for Early Childhood/Elementary Teachers. Researchers administered an attitudinal survey and an instructional strategy survey. Pre and post scores on the attitudinal survey were analyzed for any significant change in paraeducators' attitudes toward mathematics. The instructional survey was administered at the end of the course to collect information about teaching methods used and to learn how these methods impacted learning. A focus group suggested that the use of manipulatives, hands-on activities, and cooperative learning groups helped UPDATE scholars learn mathematics. The surveys suggested that the mathematics courses improved paraeducators' attitudes toward mathematics. All paraeducators received a grade of C or better in the three math courses.
Walmsley, Angela (1995) did a study on *Attitudes of Students toward Mathematics in the Transition from School to University*. The major findings of this study are as follows:

Presents a study that focuses on Irish and American students' changes in attitude toward mathematics as they make the transition from school to university. Concludes that students from both Ireland and the United States experience negative mathematical attitudes and anxiety. (ASK)

Philippou, George N.; Christou, Constantinos (1994) did a study on *The Effects of a Preparatory Mathematics Program in Changing Prospective Teachers' Attitudes towards Mathematics*. The major findings of this study are as follows:

Reports the results of a study aimed at changing prospective teachers' attitudes toward mathematics using a mathematics preparatory program designed and implemented over three years and employing questionnaires and interviews. Results showed significant improvement of attitudes, particularly toward the satisfaction from and the usefulness of mathematics.

Odell, Patricia M.; Schumacher, Phyllis (1994) did a study on *Attitudes toward Mathematics and Predictors of College Mathematics Grades: Gender*
Differences in a 4-Year Business College. The major findings of this study are as follows:

An attitude survey of 184 men and 152 women with similar math backgrounds and ability found that women appeared to prefer rote over autonomous learning and familiar over novel situations. They felt less confident in their ability to do word problems. Attitudes rather than Scholastic Aptitude Test scores were more useful in predicting grades. (SK)

INTEREST - A THEORETICAL APPROACH

Interest-meaning & definitions:

Interest is affective disposition which evokes attention and maintains it. Interest is not a motor activity. It is a tendency or a mental structure which supplies sufficient motivating power to motor activity. Interest is sometimes innate and sometimes acquired. In the fulfillment of instinctive needs, the animals are naturally interested in each other.

According to Drever, interest is a disposition in its dynamic aspect. Interest is not affective experience, but affective tendency.

According to McDougall, “Interest is latent attention, attention is interest in action.”
Interest is a mental cause of attention. It is not necessary that all men should be acquainted with their interest.

**Definitions of interest**

Interest means to make a difference. It describes why the organism tends to favour some situation and thus comes to react to them in a very selective manner. Interest and attention are very closely related. Interest is one of the subjective factors of attention. It plays an important role in the development of the behaviour and personality and is very important to understand the individuals and to guide his future plans and activities. Interest plays a major role in facilitating academic achievement.

James (1890) describes “interest as a form of selective awareness or affection that produces meaning out of the mass of one’s experiences”

Strong (1943) speaks of “interest” as “likes” and labels “dislikes” as “aversions”. It is a tendency to become absorbed in an experience and to continue it.

Downie (1961) defines interests as “motivations of learning”. According to Blair and et al (1966) “interest are learned dispositions or sets to action”.


According to Kulshrestha (1984) interest may be defined “as a tendency to make consistent choices in a certain direction without external pressure and in the face of alternatives.

Types of interests

Super (1949) classified interest into four groups depending upon the way in which information about them is obtained namely 1. expressed interest 2. manifest interest 3. Tested interest and 4. inventoried interest

Expressed interest

A person or an individual expresses that he is interested in this or that services is known as expressed interest.

Manifest interest

If an individual involved in literacy programme in addition to his regular work and taking evening classes for the illiterates are considered as manifestation of real interest in those activities.

Tested interest
Our assumption here is that, if a person knows something about a subject and scores high on an achievement test in that subject shows that he has an interest in that subject.

**Inventories interest**

An indication of a student interest is obtained here by having him choose among a large number of activities, those he likes and dislikes.

**INTEREST- A PRACTICAL APPROACH**

Clinton, Virginia Elizabeth (2012) did a study on *The Effects of Interest on Inference Generation While Reading*. The major findings of this study are as follows:

A positive association between interest and learning from texts has been well noted in the literature. However, the cause of the positive association between interest and learning from text is uncertain. The primary purpose of this dissertation was to examine a potential cause, inference generation, of the positive association between interest and learning from texts. Sixty undergraduate students participated in Experiment 1 by reading two scientific texts and writing recalls and answers to comprehension questions.
Topic interest and text-based interest were measured using self-reports. The results indicated that topic interest and text-based interest were indeed positively associated with learning from texts. In Experiment 2, sixty-nine undergraduate students participated by completing the same measures as the participants in Experiment 1, with the inclusion of the think-aloud task while reading. The results from Experiment 2 indicated that topic and text-based interest were both found to be positively associated with inference generation. Subsequent analyses indicated that inference generation explained (as a mediator) the positive association between both topic and text-based interest and accurate answers to comprehension questions. In contrast, inference generation was statistically independent from the positive association between topic interest and recall. Inference generation affected the strength of (as a moderator) the positive association between text-based interest and recall. The findings from both experiments are discussed in the context of interest and text comprehension theories, specifically in regards to standards of coherence. The secondary purpose of this dissertation was to determine the usefulness of Wii Fit [TM] boards as a cost-effective means of incorporating gross body movements as an indirect measure of interest. Gross body movement data from forty-two of the participants in Experiment 1 was measured while the participants read the
experimental texts. The findings indicated that interest and learning from text were negatively associated with both leaning back and shifting in one's seat. These findings are discussed in the context of embodied theories of cognition. The following are appended: (1) Experimental Texts; (2) Comprehension Questions; (3) Topic Interest Self-Reports; (4) Text-Based Interest Self-Report; and (5) Think-Aloud Task Instructions.

Clinton, Virginia; van den Broek, Paul (2011) did a study on Interest, Inferences, and Learning from Texts. The major findings of this study are as follows:

Topic interest and learning from texts have been found to be positively associated with each other. However, the reason for this positive association is not well understood. The purpose of this study is to examine a cognitive process, inference generation, that could explain the positive association between interest and learning from texts. In Study 1, sixty undergraduate students participated by reading two science texts, which differed in coherence levels, silently. The results replicated previous findings that topic interest is positively associated with recall and accurate answers to comprehension questions for both texts. In Study 2, sixty-nine undergraduate students
participated by reading the same two science texts while thinking aloud. The results indicated that topic interest was positively associated with inference generation while reading for the more coherently-written text. Subsequent analyses indicated inference generation partly explained the positive association between topic interest and accurate answers to comprehension questions for the more coherently-written text. The findings from Study 2 were independent of the effects of reading comprehension skill. Theoretical implications of the findings, in regard to standards of coherence and depth of processing while reading, are discussed.

Eren, Altay (2010) did a study on Prospective Teachers' Interest in Teaching, Professional Plans about Teaching and Career Choice Satisfaction: A Relevant Framework? The major findings of this study are as follows:

This study aimed to examine the relationships among prospective teachers' interest in teaching, professional engagement and career development aspirations, and career choice satisfaction. A total of 602 prospective teachers from various primary (for example, primary school teaching) and secondary (for example, English language teaching) teacher education programs of a large university in Turkey participated voluntarily in the study. The results show that,
regardless of the effects of demographic variables such as gender, age, year of study or fields of study, the prospective teachers' interest in teaching can be identified through three distinctly different profiles: high, medium and low interest in teaching. Results of the present study also demonstrate that the profiles of prospective teachers' interest in teaching were significantly related to their career choice satisfaction and professional plans.

Rotgans, Jerome I.; Schmidt, Henk G. (2010) did a study on *Situational Interest and Academic Achievement in the Active-Learning Classroom*. The major findings of this study are as follows:

The aim of the present study was to investigate how situational interest develops over time and how it is related to academic achievement in an active-learning classroom. Five measures of situational interest were administered at critical points in time to 69 polytechnic students during a one-day, problem-based learning session. Results revealed that situational interest significantly increased after the problem stimulus was presented. Subsequently, situational interest gradually decreased but at the end of the day increased again. Testing a path model relating the situational interest measures showed strong (directional) interrelations.
Moreover, situational interest was highly predictive for observed achievement-related classroom behaviors. The latter, in turn, proved to be a significant predictor of academic achievement. Aggregating situational interest over the day led to less accurate predictions of achievement-related classroom behaviors and academic achievement. Implications of these findings for situational interest research are discussed.

Sun, Jerry Chih-Yuan; Rueda, Robert (2009) did a study on *Situational Interest, Computer Self-Efficacy and Self-Regulation: Their Impact on Student Engagement in Distance Education*. The major findings of this study are as follows:

This study investigates possible relationships among motivational and learning variables (interest, self-efficacy and self-regulation) and three types of student engagement (behavioural engagement, emotional engagement and cognitive engagement) in a distance education setting. Participants were 203 students enrolled in online classes in the fall semester of 2008 in the Schools of Gerontology and Engineering at a large research university in the south-western USA, who completed an online survey assessing their levels of situational interest, computer self-efficacy, self-regulation and engagement in distance education.
Situational interest and self-regulation were found to be significantly correlated with three types of engagement (behavioural, emotional and cognitive), while computer self-efficacy did not appear to be associated with any of those engagement variables. Results suggested that online activities and tools such as multimedia and discussion boards may increase emotional engagement in online learning, although they do not necessarily increase behavioural or cognitive engagement, that educators should identify students who are taking online courses for the first time and provide necessary technical help to increase their emotional engagement, and that it is important for educators to offer students strategies for increasing their self-regulation in distance education environments.

Punteney, Katherine N. (2007) did a study on *International Careers: The Gap between Student Interest and Knowledge*. The major findings of this study are as follows:

Amidst a policy context that is ardently promoting participation in world politics, trade, and cultural exchange, institutions of higher education are increasingly committing their campuses to preparing students for professional and civic lives in a globalized world. Yet among the many approaches taken by institutions to internationalize their campuses, career development and career
counseling are underutilized methods of preparing students for international careers. This study examines the effects of an international career exploration module in general education classes on students' interest in and knowledge of international career options, arguing that the use of such a module is an effective component of preparing students for international careers.

**MOTIVATION- A THEORETICAL APPROACH:**

**Motivation-Meaning & Definitions:**

Commonly motivation has been defined as:

1. “the psychological process that gives behavior purpose and direction” (Kreitner, 1995).
2. “a predisposition to behave in a purposive manner to achieve specific, unmet needs” (Buford, Bedeian, & Lindner, 1995).
3. “an internal drive to satisfy an unsatisfied need” (Higgins, 1994);
4. “the will to achieve” (Bedeian, 1993).
5. “the inner force that drives individuals to accomplish personal and organizational goals” (Bedeian, 1993).
It is an internal state or condition that activates behaviour and gives it direction. Motivation is the energizer of behaviour and mother of all action. It results from the interactions among conscious and unconscious factors such as the 1. Intensity of desire or need, 2. Incentive or reward value of the goal, and 3. Expectations of the individual and of his or her significant others.

Motivation is the activation or energization of goal-oriented behavior. Motivation may be intrinsic or extrinsic. According to various theories, motivation may be rooted in the basic need to minimize physical pain and maximize pleasure, or it may include specific needs such as eating and resting, or a desired object, hobby, goal, state of being, ideal, or it may be attributed to less-apparent reasons such as altruism, morality, or avoiding mortality.

Internal and external factors that stimulate desire and energy in people to be continually interested in and committed to a job, role, or subject, and to exert persistent effort in attaining a goal.

Motivation results from the interactions among conscious and unconscious factors such as the (1) intensity of desire or need, (2) incentive or reward value of the goal, and (3) expectations of the individual and of his or her significant others.
Intrinsic motivation occurs when people are internally motivated to do something because it either brings them pleasure, they think it is important, or they feel that what they are learning is significant. It has been shown that intrinsic motivation for education drops from grades 3-9 though the exact cause cannot be ascertained. Also, in younger students it has been shown that contextualizing material that would otherwise be presented in an abstract manner increases the intrinsic motivation of these students.

Cassandra B. Whyte researched and reported about the importance of locus of control and academic achievement. Students tending toward a more internal locus of control are more academically successful, thus encouraging curriculum and activity development with consideration of motivation theories.

• Intrinsic motivation is based on an individual or self, being enthusiastic. Enjoying the work at hand is a fire within that desires more pleasure thus being drawn toward greater outcomes. This may be fired by goals or by the simple joy of enthusiasm.

• Extrinsic motivation takes its rise outside the individual. Training for an award, to win a prize or earn a bonus. This may amount to some coercion within the workplace. Employers may set monetary bonuses related to production goals.
Motivation involves the biological, emotional, social and cognitive forces that activate behavior.

Motivation is easy to explain for it means why we do an action or have the behavior. The other meaning can be the direction and purpose of our behavior.

**Motivation** is an internal state that activates, guides and sustains behavior. Educational psychology research on motivation is concerned with the *volition* or *will* that students bring to a task, their level of interest and *intrinsic motivation*, the personally held *goals* that guide their behavior, and their belief about the causes of their success or failure.

According to Lowell, “Motivation is defined as a psychological or internal process initiated by some need which leads to the activity and which will satisfy that need.”

According to Vernon, “It is a personality disposition or drive which determines behaviour towards or opinions and beliefs about a certain type of person, object, solution, institutions or concept.” Thurstone defines attitudes as “the degree of positive or negative effect associated with some psychological objects.”
The investigator has the motivation on going through these definitions of so many educationists.

**MOTIVATION- A PRACTICAL APPROACH:**

Komarraju, Meera (2012) did a study on *Ideal Teacher Behaviors: Student Motivation and Self-Efficacy Predict Preferences*. The major findings of this study are as follows:

Differences in students' academic self-efficacy and motivation were examined in predicting preferred teacher traits. Undergraduates (261) completed the Teaching Behavior Checklist, Academic Self-Concept scale, and Academic Motivation scale. Hierarchical regression analyses indicated that academic self-efficacy and extrinsic motivation explained 5-23 per cent of incremental variance in the ideal traits of "caring" and "professional." Students who lacked self-efficacy clearly valued the "caring" trait in an ideal teacher. Extrinsically motivated students strongly endorsed the importance of an ideal teacher being "caring" (encouraging and compassionate) and "professional" (knowledgeable and confident). Implications for instructors include rewarding extrinsically motivated student by recognizing their performance and mentoring students who lack self-efficacy.
Kusurkar, R. A.; Ten Cate, Th. J.; Vos, C. M. P.; Westers, P.; Croiset, G. (2012) did a study on *How Motivation Affects Academic Performance: A Structural Equation Modelling Analysis*. The major findings of this study are as follows:

Few studies in medical education have studied effect of quality of motivation on performance. Self-Determination Theory based on quality of motivation differentiates between Autonomous Motivation (AM) that originates within an individual and Controlled Motivation (CM) that originates from external sources. To determine whether Relative Autonomous Motivation (RAM, a measure of the balance between AM and CM) affects academic performance through good study strategy and higher study effort and compare this model between subgroups: males and females; students selected via two different systems namely qualitative and weighted lottery selection. Data on motivation, study strategy and effort was collected from 383 medical students of VU University Medical Center Amsterdam and their academic performance results were obtained from the student administration. Structural Equation Modelling analysis technique was used to test a hypothesized model in which high RAM would positively affect Good Study Strategy (GSS) and study effort, which in turn would positively affect academic performance in the form of grade point averages. This model fit well with the data, Chi square = 1.095, df = 3,
p = 0.778, RMSEA model fit = 0.000. This model also fitted well for all tested subgroups of students. Differences were found in the strength of relationships between the variables for the different subgroups as expected. In conclusion, RAM positively correlated with academic performance through deep strategy towards study and higher study effort. This model seems valid in medical education in subgroups such as males, females, students selected by qualitative and weighted lottery selection.

Matthews, Asia R.; Hoessler, Carolyn; Jonker, Leo (2012) did a study on Academic Motivation in Calculus. The major findings of this study are as follows:

Research exists on the role of motivation in student learning, especially with subjects in the humanities and social sciences (e.g., Deci, Vallerand, Pelletier, & Ryan, 1991; Vallerand, Pelletier, Blais, Briere, Senecal, & Vallieres, 1992). This body of research would be well served by broadening current understandings of students of the natural sciences. This article describes a quantitative study of first-year university engineering students taking a calculus course. The central topic that we address is how academic motivation of these students correlates with their performance. The findings indicate that the students in the study are highly motivated, extrinsically more than intrinsically, and that self-determination is
predictive of improved academic performance. However, the findings also suggest that intrinsic motivation to know plays an interesting role; specifically, it alone seems to be predictive of better performance on a conceptual part of the exam, even though this measure showed no effect on the overall exam score.

Perry, Christine A. (2012) did a study on *Motivation and Attitude of Preservice Elementary Teachers toward Mathematics*. The major findings of this study are as follows:

This study investigated preservice elementary teachers' achievement goal orientations for learning mathematics and the relationship of those goals to their attitudes toward mathematics. Self-report instruments were administered to assess three achievement goals--mastery, performance-approach, and performance-avoid, and three constructs of attitude--confidence in learning mathematics, usefulness of mathematics, and mathematics as a male domain. The preservice teachers were higher in mastery goals than in performance goals, and performance-avoid goals were higher than performance-approach goals. Mastery goals correlated positively to all three constructs of attitude. Since mathematics classes are traditionally performance-oriented, these results suggest a mismatch between personal and classroom goals that could
result in negative attitudes and the adoption of maladaptive performance-avoid goals. These findings suggest that mathematics content courses for preservice elementary teachers should be taught in a classroom climate that supports and encourages mastery goals.

Horyna, Brittny; Bonds-Raacke, Jennifer M. (2011) did a study on Differences in Students' Motivation to Attend College: Large versus Small High Schools. The major findings of this study are as follows:

The current study examined the relationship between the variables: school size, motivation, and college attendance to determine if the size of a student's high school, along with his/her motivational tendencies, influenced the student's choice to pursue a college education. Data was gathered from college students attending a small mid-west university (N = 266) using a brief demographics survey, as well as Vallerand et al.'s (1992) Academic Motivation Scale. Results of a factorial MANOVA revealed a significant main effect for sex on the motivational subscales: extrinsic motivation-identified, extrinsic motivation-external regulation, and a motivation. Additional follow-up analyses indicated the existence of significant, positive, linear relationships between approximate number of senior classmates and the following subscales: intrinsic motivation-
towards accomplishment, extrinsic motivation-identified, and extrinsic motivation-introjected. Furthermore, these results indicated a significant relationship between approximate high school enrollment and intrinsic motivation-towards accomplishment and a marginally significant relationship between approximate number of senior classmates and extrinsic motivation-external regulation. Results will be discussed in light of previous research and literature regarding secondary educational institutions, the various types of motivation, and their impact on students' academic performance.

Kim, C.; Keller, J. M. (2011) did a study on Motivation, Volition and Belief Change Strategies to Improve Mathematics Learning. The major findings of this study are as follows:

The purpose of this study was to investigate the effects of motivation, volition and belief change strategies, implemented with personal and group email messages, on students' attitudes, study habits and achievement in a calculus course for non-mathematics majors. Eighty four undergraduates enrolled in a calculus course received emails over a period of 8 weeks. The results indicated that there were negative trends in participants' attitudes towards mathematics except for the group receiving belief change strategies with
personal messages. There were also negative trends in participants' study habits except for the group receiving motivation, volition and belief change strategies with personal messages. No single group over any other showed improvement in achievement. Explanations for the findings, limitations of the study and implications and possibilities for future studies are discussed.

George, Michael (2010) did a study on Ethics and Motivation in Remedial Mathematics Education. The major findings of this study are as follows:

This study examines motivational potentialities in remedial mathematics education within an ethical context, applying a model for ethical decision making in education developed by Shapiro and Stefkovich, in which three broad ethical categories are discussed: the ethic of justice, the ethic of care, and the ethic of critique. These ethical categories are applied to two broad categories of motivational strategy: motivation by intervention and motivation by policy. It is argued that individual interventions risk encroaching on student autonomy and are ethically contravened, whereas motivation-based regimens--such as graded homework, graded tests, and required tutorials--are recommended if they may be implemented in a way
Liu, Yunzhen (2010) did a study on *Motivation and Its Relationship with Learning Strategy*. The major findings of this study are as follows:

This study investigates motivation that influences heritage and non-heritage students' learning of Chinese, and its relationship with Chinese language learning strategies (LLS). The study uses Deci and Ryan's typology--"Intrinsic Motivation" and "Extrinsic Motivation", for the investigation, examining issues such as: (1) What are Chinese students' motivations in studying Chinese?; (2) What are Chinese students' perceptions of learning strategies in studying Chinese?; and (3) What is the relationship between students' motivation and their perceptions of LLS use? The study addresses questions of both theoretical and pedagogical significance, and makes specific proposals regarding pedagogies and teaching Chinese as a Second/Foreign Language. The following are appended: (1) Background Questionnaire; (2) How do I Learn Mandarin Chinese?; (3) Factor Analysis--SILL for the Heritage Students Group; and (4) Factor Analysis--SILL for the Non-Heritage Chinese Students Group.
Koshino, Makoto; Kojima, Yuki; Kanedera, Noboru (2009) did a study on Development and Evaluation of Educational Materials for Embedded Systems to Increase the Learning Motivation. The major findings of this study are as follows:

Educational materials of embedded systems are currently used in many educational institutions. However, they have difficulties in arousing the interest of students. One of the reasons is that a poor CPU (central processing unit), which has been loaded in the current materials, cannot execute the multimedia processing. In order to make the exercises in embedded systems more practical, we developed an educational board, which we call "E+". "E+" is equipped with a RISC (reduced instruction set computer) microcontroller 32bit SH2 (SuperH), which is manufactured by Renesas Electronics Corporation. As I/O (input/output) interface, in addition to buttons and LEDs (light emitting diodes), it is loaded with sensors, such as light sensors and temperature sensors, a full-color LCD (liquid crystal display) display with a touch screen, voice input/output modules, Ethernet communication and an SD (secure digital) card on board. We introduced "E+" to the 3rd grade students (about 40 students) in the computer architecture class of department of electronics and information engineering at Ishikawa National College of Technology. This paper shows that the students are interested in the materials and that they learn the contents in an efficient manner. We conducted
an evaluation after the one-year class of computer architecture. The question which asks "Are you satisfied with the learning in this educational material?" scored a high value of 3.80/5.00. The question asking "Was this exercise helpful to improve your general technical capabilities of making things?" also scored a high value of 3.54/5.00.

Valentin, Alberto; Mateos, Pedro M.; Gonzalez-Tablas, Maria M. (2009) did a study on Motivation and Learning Strategies in the Use of ICTs among University Students. The major findings of this study are as follows:

Within the European Higher Education Area (EHEA) considerable efforts are being made to promote the incorporation of Information and Communication Technology (ICTs) in Higher Education (HE), together with placing emphasis on the cognitive and motivational components underlying learning. The objectives of this research were to analyze: (a) the relationship between different uses of ICTs and the learning outcomes and (b) the relationship between learning strategies and motivation and the use of ICTs. Four factors explain 57.4 per cent of the total variance of the types of use of ICTs. It is possible to discern four patterns of use of ICTs (Social, Technical, Academic and Educational Platforms). Our results show significant associations of the different uses of ICT with expectations of improved
performance and satisfaction. In addition, the Educational Platform Use (EPU) is linked to performance. In turn, the EPU is predicted by learning strategies and motivation variables which point to primarily motivational components. The results are discussed in relation to the difficulties inherent in the process of implementing the EHEA.

Evert, Amanda; Blackwell, Cindy; Tilley, Daniel (2008) did a study on *Students' Perceptions of Communications and Course Motivation Provided by Faculty*. The major findings of this study are as follows:

Because innovation is essential to the future of our society and because there is a need to prepare college students to succeed in business organizations, it has become increasingly important to investigate the factors that enhance or discourage creativity and innovation. College professors have a vital role in introducing students to the fundamentals of innovation and, depending on how they do, can potentially encourage or discourage the innovation process. This study focused on the communication and motivation in the innovation process of faculty in a multidisciplinary course comprised of agricultural economics, biosystems and agricultural engineering, and agricultural communication majors at a large land-grant university. Results demonstrated that students did not
always find faculty communication effective, and findings among students in the three majors were different in faculty communication ratings. The data show there are positive relationships between students' perceptions of faculty communications and students' motivation in capstone courses.

Singh, Shashi; Singh, Ajay; Singh, Kiran (2008) did a study on Motivation Levels among Traditional and Open Learning Undergraduate Students in India. The major findings of this study are as follows:

Motivation plays a crucial role in learning. Motivation energizes the behavior of the individual. It also directs the behavior towards specific goals. It helps students acquire knowledge, develop social qualities, increase initiation, persist in activities, improve performance, and develop a sense of discipline. This paper aims to compare the levels of motivation between students in the open education system (OES) and in the traditional education system (TES) in India. The study further investigates the motivation levels of male and female students in the two systems. An Academic Motivation Scale was prepared and administered on the students of TES (n = 200) and OES (n = 151). Results show that there exist significant differences in the level of motivation between the students of TES and
OES. The study concludes that it is the presence or absence of extrinsic motivation which is predominantly responsible for this difference.

Kim, Kyung Ja (2007) did a study on *Reading Motivation in Two Languages: An Examination of EFL College Students in Korea*. The major findings of this study are as follows:

This study was designed to identify underlying factors that motivate language learners to read in a foreign language (L2) context. It also examined the relationships between L1 and L2 reading motivation and any differences in reading motivation based on the learners' academic majors and L2 reading proficiency. 259 Korean EFL college students participated in this study. Participants' L1 and L2 reading motivation was measured using a Likert scale questionnaire and their L2 proficiency was estimated by test scores in their reading classes. This study yielded a four-factor solution for L2 reading motivation: "learning goal-oriented motivation", "intrinsic motivation", "avoidance of reading", and "utility value of L2 reading". The results indicated that "learning goal-oriented motivation" and "utility value of L2 reading" were the two primary indicators for the participants' desire to read in English. The study also demonstrated that the factor-based L2 reading motivation scales correlated with
some of the L1 reading motivation scales in the relatively low range but statements about the connection or transfer issue of reading motivation between the two languages must be tentative. All L2 reading motivation scales revealed significant differences between English and non-English majors except in "utility value of L2 reading". Furthermore "intrinsic" and "avoidance scales" also differed significantly depending on the participants' L2 reading proficiency.

Liang, Chaoyun; Hsu, Yuling; Chang, Chi-Cheng (2007) did a study on *Intrinsic Motivation as a Mediator on Imaginative Capability Development*. The major findings of this study are as follows:

The present study explored which environmental and psychological variables influenced the imagination of video/film major university students, and the effects these variables had on their imaginative capability development. The hypothesis of the study--that "intrinsic motivation" played a mediating role in imaginative capability development--was partially supported. The structural model also showed that both "inspiration through action" and "self-efficacy" demonstrated positive, direct effects on reproductive imagination, while "negative emotion" had a negative, direct effect. Creative imagination was positively influenced by "inspiration through action," but negatively influenced by
"negative emotion." In addition, "organizational measure," "social climate," "generative cognition," "positive emotion," "inspiration through action," and "self-efficacy" had significant and indirect effects on both types of imagination.

Dela Rosa, Kevin; Eskenazi, Maxine (2005) did a study on *Self-Assessment in the REAP Tutor: Knowledge, Interest, Motivation, & Learning*. The major findings of this study are as follows:

Self-assessment questionnaires have long been used in tutoring systems to help researchers measure and evaluate various aspects of a student's performance during learning activities. In this paper, we chronicle the efforts made in the REAP project, a language tutor developed to teach vocabulary to ESL students through reading activities, to understand the usefulness of self-assessment questionnaires for gauging knowledge, motivation, and interest. Additionally, we discuss the appropriate use of self-assessment questions and correlations we have found with learning and user behavior.

Liu, Ou Lydia; Bridgeman, Brent (2005) did a study on *Measuring Learning Outcomes in Higher Education: Motivation Matters*. The major findings of this study are as follows:
With the pressing need for accountability in higher education, standardized outcomes assessments have been widely used to evaluate learning and inform policy. However, the critical question on how scores are influenced by students' motivation has been insufficiently addressed. Using random assignment, we administered a multiple-choice test and an essay across three motivational conditions. Students' self-report motivation was also collected. Motivation significantly predicted test scores. A substantial performance gap emerged between students in different motivational conditions (effect size as large as 0.68). Depending on the test format and condition, conclusions about college learning gain (i.e., value added) varied dramatically from substantial gain ($d = 0.72$) to negative gain ($d = -0.23$). The findings have significant implications for higher education stakeholders at many levels.

Perry, Christine A. (2005) did a study on *Motivation and Attitude of Preservice Elementary Teachers toward Mathematics*. The major findings of this study are as follows:

This study investigated preservice elementary teachers' achievement goal orientations for learning mathematics and the relationship of those goals to their attitudes toward mathematics. Self-report instruments were administered to
assess three achievement goals—mastery, performance-approach, and performance-avoid, and three constructs of attitude—confidence in learning mathematics, usefulness of mathematics, and mathematics as a male domain. The preservice teachers were higher in mastery goals than in performance goals, and performance-avoid goals were higher than performance-approach goals. Mastery goals correlated positively to all three constructs of attitude. Since mathematics classes are traditionally performance-oriented, these results suggest a mismatch between personal and classroom goals that could result in negative attitudes and the adoption of maladaptive performance-avoid goals. These findings suggest that mathematics content courses for preservice elementary teachers should be taught in a classroom climate that supports and encourages mastery goals.

Obrentz, Shari B. (2005) did a study on *Predictors of Science Success: The Impact of Motivation and Learning Strategies on College Chemistry Performance*. The major findings of this study are as follows:

As the number of college students studying science continues to grow, it is important to identify variables that predict their success. The literature indicates that motivation and learning strategy use facilitate science success. Research
findings show these variables can change throughout a semester and differ by performance level, gender and ethnicity. However, significant predictors of performance vary by research study and by group. The current study looks beyond the traditional predictors of grade point averages, SAT scores and completion of advanced placement (AP) chemistry to consider a comprehensive set of variables not previously investigated within the same study. Research questions address the predictive ability of motivation constructs and learning strategies for success in introductory college chemistry, how these variables change throughout a semester, and how they differ by performance level, gender and ethnicity. Participants were 413 introductory college chemistry students at a highly selective university in the southeast. Participants completed the Chemistry Motivation Questionnaire (CMQ) and Learning Strategies section of the Motivated Strategies for Learning Questionnaire (MSLQ) three times during the semester. Self-efficacy, effort regulation, assessment anxiety and previous achievement were significant predictors of chemistry course success. Levels of motivation changed with significant decreases in self-efficacy and increases in personal relevance and assessment anxiety. Learning strategy use changed with significant increases in elaboration, critical thinking, metacognitive self-regulation skills and peer learning, and significant decreases in time and study management
and effort regulation. High course performers reported the highest levels of motivation and learning strategy use. Females reported lower intrinsic motivation, personal relevance, self-efficacy and critical thinking, and higher assessment anxiety, rehearsal and organization. Self-efficacy predicted performance for males and females, while self-determination, help-seeking and time and study environment also predicted female success. Few differences in these variables were found between ethnicity groups. Self-efficacy positively predicted performance for Asians and Whites, and metacognitive self-regulation skills negatively predicted success for Other students. The results have implications for college science instructors who are encouraged to collect and utilize data on students' motivation and learning strategy use, promote both in science classes, and design interventions for specific students who need more support.

Tanaka, Masaaki; Watanabea, Yasuyoshi (2005) did a study on Academic and Family Conditions Associated with Intrinsic Academic Motivation in Japanese Medical Students: A Pilot Study. The major findings of this study are as follows:

Objective: Intrinsic academic motivation is one of the most important psychological concepts in education, and it is related to academic outcomes in
medical students. This study examined the relationships between academic and family conditions and intrinsic academic motivation. Design: Cross-sectional design. Setting: The study group consisted of 120 healthy second-year medical students. Method: Participants completed questionnaires dealing with intrinsic academic motivation, lifestyle factors, academic and family conditions, and academic performance. Results: In the multiple regression analysis (adjusted for age, gender, and lifestyle factors), taking pleasure in school and spending time with family were positively associated with intrinsic academic motivation scores. Conclusion: Pleasure in school and spending time with family are correlated with intrinsic academic motivation among medical students. Good academic and family conditions may contribute to lowering the incidence of and/or increasing the rates of recovery from low intrinsic academic motivation.

Hon-keung, Yau; Man-shan, Kan; Lai-fong, Cheng Alison (2004) did a study on The Impact of Curiosity and External Regulation on Intrinsic Motivation: An Empirical Study in Hong Kong Education. The major findings of this study are as follows:

The purposes of this study are to identify: (1) the factors affecting the intrinsic motivation of university students in Hong Kong; and (2) gender
differences in the perception of intrinsic motivation in Hong Kong higher education environment. The factors of curiosity and external regulation with intrinsic motivation are taken into investigation in this study, because these factors and intrinsic motivation of the local university students have seldom been examined. This study adopting a survey of 162 sampled students, was conducted in a local university in 2011. Findings showed that students with curiosity could lead to their higher intrinsic motivation, but external regulation was not found to be related to intrinsic motivation. In addition, there are no gender differences on the level of intrinsic motivation.

Herman, Geoffrey L. (2003) did a study on Designing Contributing Student Pedagogies to Promote Students' Intrinsic Motivation to Learn. The major findings of this study are as follows:

In order to maximize the effectiveness of our pedagogies, we must understand how our pedagogies align with prevailing theories of cognition and motivation and design our pedagogies according to this understanding. When implementing Contributing Student Pedagogies (CSPs), students are expected to make meaningful contributions to the learning of their peers, and consequently, instructors inherently give students power and control over elements of the class.
With this loss of power, instructors will become more aware that the quality of the learning environment will depend on the level of students' motivation and engagement rather than the instructor's mastery of content or techniques. Given this greater reliance on student motivation, we will discuss how motivation theories such as Self-Determination Theory (SDT) match and support the use of CSP and how CSP can be used to promote students' intrinsic motivation (IM) to learn. We conclude with examples of how we use principles of SDT to guide our design and use of CSP. We will particularly focus on how we changed the discussion sections of a large, required, sophomore-level class on digital logic and computer organization at a large, research university at relatively low-cost to the presiding class instructor.

Peters, Stephanie; Barbier, Marie; Faulx, Daniel (2003) did a study on Learning and Motivation to Transfer after an E-Learning Programme: Impact of Trainees' Motivation to Train, Personal Interaction and Satisfaction. The major findings of this study are as follows:

While e-learning appears to be increasingly present in training and education, the systematic evaluation of its effectiveness remains understudied. In this paper, we determine the mediating role of satisfaction between
motivation to train and personal interaction, on the one hand, and learning and motivation to transfer, on the other hand. A particularity of this study is that we distinguish between different dimensions of satisfaction—enjoyment, utility, difficulty and take into account lack of personal interaction as a variable influencing satisfaction. Results of structural equation modelling analyses show an impact of the enjoyment dimension on learning, and of the utility and difficulty dimensions on motivation to transfer. The results also stress the importance of interaction opportunities, as these have an indirect effect on learning and motivation to transfer.

Propero, Moises; Russell, Amy Catherine (2003) did a study on *Effects of Motivation on Educational Attainment: Ethnic and Developmental Differences among First-Generation Students*. The major findings of this study are as follows:

This study investigated differences in educational motivation among Hispanic and non-Hispanic first-generation students (FGS). Participants were 315 high school and college students who completed a revised academic motivation survey that measured participants' educational motivation (intrinsic motivation, extrinsic motivation, and a motivation). The study found that extrinsic and a motivation were significant
predictors of grade point averages (GPAs) among FGS. In addition, high school FGS and Hispanic students were more likely to report higher intrinsic motivation than college FGS and non-Hispanic students. Implications for higher education are discussed.

Jones, M. E.; Antonenko, P. D. (2001) did a study on *The Impact of Collaborative and Individualized Student Response System Strategies on Learner Motivation, Metacognition, and Knowledge Transfer*. The major findings of this study are as follows:

This study investigated the impact of collaborative and individualized student response system-based instruction on learner motivation, metacognition, and concept transfer in a large-enrolment undergraduate science course. Participants in the collaborative group responded to conceptual questions, discussed their responses in small groups, and provided a revised response to the question (peer instruction [PI]). A comparison group provided individualized responses (IRs) to the same questions. Results of the motivation measure revealed a drop in confidence for students in both groups. This may be explained by a significant increase in the knowledge of cognition in both IR and PI groups, which likely mediated a recalibration of confidence to a lower, yet more realistic
level. A significant interaction was found between gender and student response system strategy relative to the regulation of cognition, revealing that females improved in the PI group, while males reported improvement in the regulation of cognition in the IR group. A custom instrument was developed to measure near and far concept transfer abilities. The PI group scored significantly higher on the test of near transfer than the IR group.

De Feyter, Tim; Caers, Ralf; Vigna, (2000) did a study on Claudia Unraveling the Impact of the Big Five Personality Traits on Academic Performance: The Moderating and Mediating Effects of Self-Efficacy and Academic Motivation. The major findings of this study are as follows:

The main purpose of this study is to unravel the impact of the Big Five personality factors on academic performance. We propose a theoretical model with conditional indirect effects of the Big Five personality factors on academic performance through their impact upon academic motivation. To clarify the mixed results of previous studies concerning the impact of neuroticism, we suggest a moderating role of self-efficacy. Hierarchical, moderated mediation and mediated moderation regression analyses were performed on longitudinal data collected from 375 students of a University college in Belgium. The findings
revealed a positive indirect effect of neuroticism on academic performance at higher levels of self-efficacy, complemented by a positive direct effect of neuroticism at lower levels of self-efficacy. Finally, this study showed that conscientiousness positively affected academic performance indirectly through academic motivation, but also that it is a condition for the indirect impact of extraversion, neuroticism, and conscientiousness.

Gu, Mingyue; Lai, Chun (2000) did a study on *Motivation and Commitment: Pre-Service Teachers from Hong Kong and Mainland China at a Training Institute in Hong Kong*. The major findings of this study are as follows:

Research indicates that historical and social backgrounds influence individuals' motivation to teach and their commitment to teaching (Gordon, 2000; Su, Hawkins, Huang & Zhao, 2001). This article reports on a comparative study exploring the motivation to teach and the commitment to teaching among non-local prospective student teachers from mainland China and their Hong Kong local counterparts. This study was based on the accounts of prospective student teachers after their first semester of study at a teacher training institute, at which time they had not yet had the chance to observe or experience teaching in actual Hong Kong schools. Their motivation to teach might well change as they gain
more and better understanding of the sociopolitical contexts of Hong Kong education and the institutional culture of Hong Kong schools. Thus, a longitudinal study following prospective student teachers over time to investigate fluctuations in their motivation to teach might provide insights into the interaction between their assessment and re-assessment of socio-cultural contexts, their evolving teaching identity and their motivation to teach.

McGill, Monica M. (2000) did a study on *Learning to Program with Personal Robots: Influences on Student Motivation*. The major findings of this study are as follows:

One of the goals of using robots in introductory programming courses is to increase motivation among learners. There have been several types of robots that have been used extensively in the classroom to teach a variety of computer science concepts. A more recently introduced robot designed to teach programming to novice students is the Institute for Personal Robots in Education (IPRE) robot. The author chose to use this robot and study its motivational effects on non-computer science students in a CS0 course. The purpose of this study was to determine whether using the IPRE robots motivates students to learn programming in a CS0 course. After considering various motivational theories and
instruments designed to measure motivation, the author used Keller's Instructional Materials Motivation Survey to measure four components of motivation: attention, relevance, confidence, and satisfaction. Additional items were added to the survey, including a set of open-ended questions. The results of this study indicate that the use of these robots had a positive influence on participants' attitudes towards learning to program in a CS0 course, but little or no effect on relevance, confidence, or satisfaction. Results also indicate that although gender and students interests may affect individual components of motivation, gender, technical self-perception, and interest in software development have no bearing on the overall motivational levels of students.

Parlett, Deborah K. (1999) did a study on *A Comparison of Associate and Bachelor Degree Nursing Students' Motivation*. The major findings of this study are as follows:

Student motivation is a key factor in determining whether college students are successful in their academic careers and, ultimately their professional careers. Motivation is an internal drive within a person to move to action to complete a task. Student motivation encompasses self-regulation, determination, and efficacy. It is important for educators to develop curricula that encourage
students to maintain their educational focus and motivation. Previous researchers have developed motivational theories, such as goal, self-determination, and future-time perspective, to identify factors that influence student learning. Examining how motivational skills are related to academic achievement in 2-year and 4-year college programs of nursing has not been examined. Therefore, the purpose of this study was to examine how motivational strategies were related to academic achievement in nursing students and if this differed by type of program. The Motivated Strategies for Learning Questionnaire (MSLQ) was distributed to volunteer first-year nursing students in a 2-year community college and a 4-year college at the end of the semester. Responses were analyzed utilizing the strategy of multiple regression to determine the group similarities and differences regarding their motivational variances, skill sets, strategy utilization, and academic achievement between these associate and bachelor degree nursing students. The most notable conclusion emphasized there was no difference between 2-year and 4-year students in motivational skills that influence academic achievement. The study contributes to positive social change by identifying motivational and social factors in nursing education to maintain academic success and accelerating the social process that will ultimately better serve the public interest in the quality of nursing care they receive.
Huss-Keeler, Rebecca; Peters, Michelle; Moss, Joy Marie (1998) did a study on *Motivation for Attending Higher Education from the Perspective of Early Care and Education Professionals*. The major findings of this study are as follows:

The field of early care and education has been challenged to raise the level of quality for young children by increasing the number of practitioners with college degrees. The purpose of this study was to explore the perceptions of early care and education professionals working in the field and enrolled in community college early childhood classes, about the benefits of attending classes, and the factors that motivated them to pursue a college degree. The majority of the participants were not attending college for the first time and previously attempted to return to school to complete a certificate or an associate degree. Motivational factors and perceived benefits, which varied by teachers and directors, were influenced by the number of years that the practitioners worked in the field. Personal goals and professional development were main motivators, but younger teachers also valued the degree for their future careers. Directors played a pivotal role in motivating teachers to enroll in college, while scholarship assistance made it possible to act on desires to go to college. These findings point to differentiated, targeted marketing and recruitment for teachers and directors,
relevant early childhood college coursework, and continuous available funding to complete degrees.

Singh, Shashi; Singh, Ajay; Singh, Kiran (1995) did a study on Academic Motivation among Urban & Rural Students: A Study on Traditional vs Open Education System in India. The major findings of this study are as follows:

Higher education today is being viewed as a tool to achieve prosperity and high living standards. It is thus looked upon as a service to the society and a powerful weapon to change the society for its betterment. Motivation plays a crucial role in learning. Motivation energizes the behavior of the individual. It also directs the behavior towards specific goals. It helps in acquisition of knowledge, develops social qualities, increases initiation of persistence in activities, leads to improved performance and develops a sense of discipline in the individual. This paper aims to compare Open Education System and Traditional Education System with respect to Academic Motivation of students towards the two types of education systems. This paper also tries to compare the academic motivation of rural and urban based students. It has been found in this paper that there is significant different in Academic Motivation among students of the two types of education systems. The significant difference in academic motivation has also
been found in urban and rural based students, compared between the two systems. The paper has also forwarded some suggestions which may be considered by the policy makers and administrators of OES to help increase the academic motivation of students of OES.

Rotgans, Jerome I.; Schmidt, Henk G. (1994) did a study on *The Intricate Relationship between Motivation and Achievement: Examining the Mediating Role of Self-Regulated Learning and Achievement-Related Classroom Behaviors*. The major findings of this study are as follows:

The objective of the present study was to examine how motivation is related to academic achievement. The "Motivated Strategies for Learning Questionnaire" (MSLQ) was administered to 1,166 students at a polytechnic in Singapore as a measure for motivational beliefs and self-regulated learning strategies. In addition, students' prior knowledge, achievement-related classroom behaviors, and academic achievement were included in the analysis. Path analysis revealed that motivation is not directly related to achievement. Instead, the relationship was mediated by both learning strategies and achievement-related classroom behaviors. Prior achievement was a good predictor of subsequent achievement but had no influence on student motivation. Overall, the results
suggest that motivation as operationalized by self-report seems to be a construct with limited predictive validity for academic achievement.

Hossainy, Fakhrozaman Naeemi; Zare, Hossein; Hormozi, Mahmud (1991) did a study on *Designing and Implementing a Situated Learning Program and Determining Its Impact on the Students' Motivation and Learning*. The major findings of this study are as follows:

Inability to use knowledge is one of the major problems that university graduates face. Some instructional designers recommend situated learning for the solution. The purpose of this study is to determine the effect of situated learning on students' school motivation and achievement. The two main hypotheses are:

1- Situated learning increases learning.
2- Situated learning increases school motivation.

Thirty four psychology junior students at Payame Noor University, Tehran, Iran participated in the study. Classes were randomly selected for situated learning curriculum and lecture-based curriculum. Lecture-based curriculum was performed in face to face classroom. Situated learning was carried out in blended learning approach. Data was collected by school achievement test and the short form of Mc Inerney and Sinclairer standard motivation questionnaire, before and after interventions. Statistical analysis was done by
SPSS software version 15. It was shown that situated learning increased academic achievement (p less than 0.001) and motivation (p less than 0.001) in comparison to lecture-based learning and can serve as a good method in instructional programs.

Arnold, Ivo J. M.; Straten, Jerry T. (1990) did a study on *Motivation and Math Skills as Determinants of First-Year Performance in Economics*. The major findings of this study are as follows:

The importance of math skills for study success in economics has been widely researched. This article adds to the literature by combining information on students' math skills and their motivation. The authors are thus able to present a rich picture of why students succeed in their study of economics and to confirm previous findings that deficient math preparation bodes ill for first-year study success in economics. However, the authors also find that within the population of math-deficient students, motivation matters. Applying factor analysis to a survey of students at Erasmus School of Economics, the authors identify four motivational factors; among these, intrinsic motivation is most strongly related to first-year study success. The authors also show that intrinsic motivation may help to overcome inadequate preparatory math education.
George, Michael (1990) did a study on *Autonomy and Motivation in Remedial Mathematics*. The major findings of this study are as follows:

Research has shown that a significant majority of students in remedial mathematics do not remediate successfully. 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 article argues that student autonomy should be taken into consideration when choosing strategies through which students are motivated for achievement.

Keklik, Ibrahim; Erdem-Keklik, Devrim (1990) did a study on *Examination of High School Students' Motivation and Learning Strategies*. The major findings of this study are as follows:

Today's societies strive toward not leaving any children behind in their educational systems. Efficacy of educational inputs and processes is of paramount importance in today's education. Research studies can provide essential input in
efforts toward attaining such efficacy. Thus, the purpose of this study was to test if high school students' motivation and learning strategies scores differed significantly according to their gender, grade level, mother's level of education and father's level of education. Participants of the study were 318 volunteering high school students. Motivational and Learning Strategies Questionnaire and the Demographic Information Form were used for data collection. Data analysis was done with ANOVA and MANOVA procedures. Results showed that students' scores on motivation factor differed only according to grade level. Their scores on learning strategies factor differed according to both gender and grade level. Results, limitations of the study and implications for educators and school counselors were discussed.

McDonald, Lex (1990) did a study on Learning, Motivation, and Transfer: Successful Teacher Professional Development. The major findings of this study are as follows:

In this study, mainly concerned with three key issues of teacher professional development--teacher learning, motivation, and transfer of learning. Each issue has received minimal attention in teacher professional development literature. The three issues are discussed, and a model of an integrative
professional development approach is outlined, with the key features of teacher motivation and learning linked to transfer.

Rengel, R.; Martin, M. J.; Vasallo, B. G. (1990) did a study on Supervised Coursework as a Way of Improving Motivation in the Learning of Digital Electronics. The major findings of this study are as follows:

This study presents a series of activities and educational strategies related to the teaching of digital electronics in computer engineering. The main objective of these methodologies was to develop a final tutored coursework to be carried out by the students in small teams. This coursework was conceived as consisting of advanced problems or small projects that should serve as a compendium of the knowledge acquired during the course, with competition between the groups and students' assuming a professional role being key incentive factors. The result was that students had a high degree of motivation and engagement in the activity, as well as improved knowledge because of the self-learning required in carrying out the coursework.

Zook, J. M.; Herman, A. P. (1990) did a study on Course-Specific Intrinsic Motivation: Effects of Instructor Support and Global Academic Motivation. The major findings of this study are as follows:
This study examined the effects of instructor support and students' global academic motivation on students' course-specific intrinsic motivation. The authors hypothesized, based on self-determination theory (Ryan & Deci, 2000), that instructor support for students' psychological needs would enhance intrinsic motivation. Students reported their global academic motivation as well as instructor support, perceptions of autonomy, competence and relatedness, and intrinsic motivation in a specific course. Instructor support predicted students' course-specific intrinsic motivation; effects were mediated by students' perceptions of autonomy and competence. Students' global intrinsic motivation directly affected their course-specific intrinsic motivation and had an indirect effect mediated by their perceptions of autonomy. Implications for college teaching are discussed.

ACHIEVEMENT- A THEORETICAL APPROACH:

The investigator is interested in mathematics. Mathematics is queen of all sciences. In our daily life each and every minute mathematics is essential. Even though it is interesting it needs more explanation. Role of the mathematics teacher is vital. Evaluating the mathematical knowledge leads to effective learning.
**Personnel tests:**

Individual or psychological tests used in employee selection and assessment of job performance, and comprising (a) aptitude tests, which measure basic abilities and skills, (b) achievement tests which measure job specific abilities such as typing skill (c) personality and interest inventories, which are used as ‘predictors’ of job performance.

**Achievement**

Achievement tests are designed to measure a student's performance in specific academic areas such as reading comprehension, written or oral expression, and mathematical computations. An achievement test may be designed to be given to a large group of students at one time, or it may be intended for more individualized testing. Schools may make use of large-scale achievement tests in order to evaluate the overall success of the school in delivering the curriculum such that students are learning the necessary skills for their grade level. Tests often used for this sort of assessment include the Stanford Achievement Tests, California Achievement Tests, the Iowa Tests of Basic Skills, the Canadian Achievement Tests and the Canadian Tests of Basic Skills.
Examples of achievement tests used in small group or individualized settings include the Wechsler Individual Achievement Test, the Kaufman Test of Educational Achievement, and the Peabody Individual Achievement Test. These tests may be used when a learning disability is suspected, in order to measure the academic progress of a homeschooled student, or to determine placement in school programs for special populations such as gifted students.

A dictionary mentioned achievement is meant for

“the act of achieving a thing achieved, especially by skill, work, courage, etc “

It is the act of reaching a feat.

An achievement is something that is accomplished, particularly by great effort, courage or special skills.

Moving quickly up the ladder at a prestigious company is an example of an achievement.

Evaluation is the pivot of educational system. Goals or aims are only cherished desires which decorate the reports of education commission. Curriculum also remains confined to booklets on syllabus.
It is evaluation alone which gives an exact idea of what has actually been achieved at the end of a particular period or stage as a result of the teaching-learning experiences, provided in the classroom.

Evaluation is also the process of determining the extent to which the aims and objectives are being attained. Again, the maintenance of good educational programmers and the improvement of techniques and procedures of education also require good evaluation.

It is, therefore, that there is a close relationship between objectives, learning experiences and evaluation. Object ship between objectives, learning experiences and evaluation.

It is; therefore, legitimate to ascertain how far our evaluation programme is in conformity with the philosophy that has determined the aims and objectives of education, its curriculum and its methodology.

It was this judgment that led the educationists in many progressive countries to search for the philosophical analysis which proved very helpful in thrashing out the issue and in overhauling the entire system of examination.

The term 'examination' which was mainly based on essay and which measured only the factual knowledge retained by the pupils, was replaced by the
new term 'evaluation' which takes into account the growth of the child as a whole individual and in his total environment.

It is also this philosophical analysis which is responsible for the movement of objectivity in the field of relationship between philosophy and valuation.

As teachers, we probably have to set and mark tests within our school as well as prepare candidates for external exams. There are many ways of evaluating learner performance and level, but here we’ll look at four types we may be involved in with our classes.

In indigo dictionary we can read performance in school or college in a standardized series of educational tests. The term is used more generally to describe performance in the subjects of the curriculum.

1. Placement

The aim of a placement test is to help sort new students into teaching groups of roughly the same level. As they are not related to any particular course taken these tests often start simply and get more difficult to cater for a range of abilities. We want to know their general standard rather than test specific language points and a variety of test activities will give us better results than a single assessment. The subject matter of any reading and listening texts, speaking and writing tasks is usually based on common human experience – something everyone can relate to.
An interview is useful as we can gauge the students’ spoken accuracy and fluency at the same time as putting a face to a filing number.

2. Diagnostic

A diagnostic (also known as formative or progress) test lets you and the students know how well they have learnt particular course elements and are typically done at the end of course book units or recent classwork. The test content and question types should be familiar to students and you should expect a high degree of success as they know what’s in the test. The results also show which areas need revising with the class or individuals.

3. Achievement

It is also called an attainment or summative test, an achievement test aims to measure what has been learnt over a longer period of time than a diagnostic test. End of course school tests, as well as externally set exams, show the standard reached and results can be compared to other students. An achievement test doesn’t relate to a particular course book, but to the aims of the syllabus. International exams such as the Cambridge ESOL suite are an example where the standard required to pass is consistent year to year.

4. Proficiency
Cambridge IELTS and the American TOEFL tests are proficiency tests in that they aim to provide a snapshot of a candidate’s ability to apply what they know. Such tests have a future orientation and are often used by further education bodies, employers and immigration authorities to determine acceptable standards for applicants. The question asked is whether their English is good enough to cope with foreseen demands and a way to try and assess this is by representative testing and purposive testing. The former is concerned more with the quality of language. You might assume that correctly filling in a cloze passage means the student grasps the structure of the language. The latter focuses on effectiveness of communication. Can the student write an appropriate letter or follow instructions. These four test types overlap; there are elements of proficiency in the three other types, but all have to be valid, reliable and practical. A marking scheme has to be drawn up and results collated. We’ll consider what to test, how to mark and what constitutes a pass in another article.

An achievement test is a test of developed skill or knowledge. The most common type of achievement test is a standardized test developed to measure skills and knowledge learned in a given grade level, usually through planned instruction, such as training or classroom instruction.
Achievement tests are Standardized tests, administered to groups of students, intended to measure how well they have learned information in various academic subjects.

Spelling tests, timed arithmetic tests, and map quizzes are all examples of achievement tests. Each measures how well students can demonstrate their knowledge of a particular academic subject or skill. Achievement tests on a small scale like these are administered frequently in schools. Less frequently, students are given more inclusive achievement tests that cover a broader spectrum of information and skills. For instance, many states now require acceptable scores on "proficiency" tests at various grade levels before advancement is allowed. Admission to colleges and graduate studies depends on achievement tests such as the **Scholastic Assessment Test**.

Useful achievement tests must be both reliable and valid. Reliable tests are consistent and reproducible. That is, a student taking a similar test, or the same test at a different time, must respond with a similar performance. Valid tests measure achievement on the subject they are intended to measure. For example, a test intended to measure achievement in arithmetic—but filled with difficult vocabulary—may not measure arithmetic achievement at all. The students who score well on such a test may be those who have good vocabularies or above-
average reading ability in addition to appropriate arithmetic skills. Students who fail may have achieved the same arithmetic skills, but did not know how to demonstrate them. Such tests would not be considered valid. In order for reliable comparisons to be made, all standardized tests, including achievement tests, must be given under similar conditions and with similar time limitations and scoring procedures. The difficulty of maintaining consistency in these administration procedures makes the reliability of such tests questionable, critics contend.

Many researchers point to another problem with achievement tests. Because it is difficult to distinguish in test form the difference between aptitude innate ability and achievement learned knowledge or skills—the results of tests that purport to measure achievement alone are necessarily invalid to some degree. Also, some children attain knowledge through their experiences, which may assist them in tests of academic achievement. The presence of cultural biases in achievement tests is a frequent topic of discussion among educators, psychologists, and the public at large. Political pressure to produce high scores and the linking of achievement to public funds for schools have also become part of the achievement-test controversy.

Yet further skepticism about achievement test results comes from critics who contend that teachers frequently plan their lessons and teaching techniques to
foster success on such tests. This "teaching to the test" technique used by some teachers makes comparisons with other curricula difficult; thus, test scores resulting from the different methods become questionable as well. **Test anxiety** may also create unreliable results. Students who experience excessive anxiety when taking tests may perform below their level of achievement. For them, achievement tests may prove little more than their aversion to test-taking.

Achievement tests are designed to measure a student's performance in specific academic areas such as reading comprehension, written or oral expression, and mathematical computations. An achievement test may be designed to be given to a large group of students at one time, or it may be intended for more individualized testing. Schools may make use of large-scale achievement tests in order to evaluate the overall success of the school in delivering the curriculum such that students are learning the necessary skills for their grade level. Tests often used for this sort of assessment include the Stanford Achievement Tests, California Achievement Tests, the **Iowa** Tests of Basic Skills, the Canadian Achievement Tests and the Canadian Tests of Basic Skills.

Examples of achievement tests used in small group or individualized settings include the Wechsler Individual Achievement Test, the Kaufman Test of Educational Achievement, and the Peabody Individual Achievement Test. These
tests may be used when a learning disability is suspected, in order to measure the
academic progress of a homeschooled student, or to determine placement in
school programs for special populations such as gifted students.

What achievement tests do not measure

Achievement tests are not intended to measure raw intelligence or aptitude.
An achievement test will not measure a student's intelligence quotient (IQ) nor will
it predict how well a student is likely to do in a specific academic area. An
achievement test can be used side by side with an IQ test such as the Wechsler
Intelligence Scale for Children, or with an aptitude test like the Canadian Test of
Cognitive Skills, to detect differences between raw potential and actual
performance. Such discrepancies may be due to specific learning disabilities,
which can be confirmed with further testing, or they may indicate a need to offer
learning activities better suited to the student's interests and abilities.

Scoring of achievement tests

Achievement tests are standardized test that measure how well a student
performs in comparison to large groups of students at the same age or grade level
who have also taken that test. Scores can be expressed in terms of a grade level, or
as a percentile. A grade level score is expressed as a decimal, for example a score
of 3.2 indicates achievement around the second month of the third grade. A score of 7.9 indicates achievement at the end of the seventh grade.

A student's percentile score shows where he fits on a bell curve of students at the same age or grade level. If he scores in the 53rd percentile, he scored better than 53 percent of peers who took the test. If he scores in the 97th percentile, he performed better than 97 percent of his peers. A score around 50 is average, and a large number of students will be clustered around this level. Scores below the 25th or above the 75th percentile will be more rare. They may be signs of impairment or of giftedness, but further testing will be required to explore these possibilities.

**Achievement tests in a homeschooling environment**

Homeschoolers may find that achievement tests are a useful tool for planning and evaluating their educational program. Neuropsychologist Suzanne Day recommends achievement tests before beginning to home school in order to establish a baseline for academic performance, especially if there are suspected learning difficulties. This allows parents to arrange for further testing as needed. Identifying specific strengths and weaknesses gives parents the ability to adapt the curriculum to better suit their children. In the case of parents who must report the child's progress to the educational authority, it can be helpful to have a baseline set at the beginning of the year, with which to compare the child's end of the year
achievement. If the child is below grade level in any subject area, but has made progress equivalent to one grade level during the year, parents can be assured that the child is making headway and will not fall into doubting their ability to home school.

Large scale achievement tests are generally only available to schools, but some suppliers will sell them to families who home school. The test is written at home following the directions, and then all the materials are returned to the supplier for scoring. Test scores are sent through the mail. Parents have the option of hiring a teacher or invigilator if they need to have more formal proof of objective assessment, but they are not obliged to do so. Testing in this manner is economical, and it can be less stressful for the students. Hiring an educational psychologist to conduct individual achievement tests is more expensive, but if learning difficulties are suspected this is one of the first steps towards a complete psycho-educational screening that will pinpoint issues such as dyslexia, ADHD or autism spectrum disorders.

Performance in School or College in a standardized series of educational tests.

The term is used more generally to describe performance in the subject of the curriculum.
Achievement-Indian studies

Sharma (1973) made a critical study of compulsory courses in the theory of education offered by universities for the B.Ed degrees. Large number of secondary school trained teachers expressed that subject knowledge helped them must and training helped them least in becoming successful teachers.

Something accomplished successfully, especially by means of exertion, skill, practice, or perseverance.

The act of achieving or performing; an obtaining by exertion; successful performance; accomplishment; as, the achievement of his object.

- Making judgements involves both student and teacher.
- Evidence is collected cumulatively over the year, in contexts across the curriculum and is brought together to judge achievement in relation to National Standards.
- There is a need for information from a range of assessment approaches so that decisions are dependable.
An overall teacher judgement (OTJ) is used to determine which standards are the best fit, then whether a student is above, at, below or well below the standards that relate to their level.

Patel (1975) studied 200 B.Ed students to find out the relation between perceptual factors and success in teacher education course. The study revealed that out of five perceptual factors, self perception and teacher professional perception emerged as significant correlates for success in final theory examination.

Vyas (1982) found that the University theory marks of B.Ed students could be predicated on the basis of academic achievement, verbal intelligence and teaching aptitude in case of total sample ($n = 300$); whereas in the case of the made sample, predictors were academic achievement, verbal intelligence, attitude towards teaching and SEs. In the case of female sample, the predictors were academic achievement and teaching aptitude.

Gopalacharyalu (1984) reported that multiple regression analysis revealed that SEs, attitude towards profession and training, Factor-B, Factor-N and Factor-Q2 of 16 PF were significant with the criterion of achievement in theory of student teachers of TTIs.
In the elements of educational psychology Chopra.R.K.(2006), The needs, wants, wishes, desires, and purposes that are common to students as a group should be known by the teacher. Such knowledge not only will make the teacher’s objectives for the class as a whole more realistic, but will health the teacher in the understanding of the individual students in the class.

Perumal. R. (1997) reveals that knowledge and performance of mathematics teacher trainees must be made academically and professionally relevant enough to be of consequence. The B.Ed students of mathematics group studying in aided instituters Govt. institutions and University departments do differ in knowledge competency and perform ace competency, but not in consequence competency.

Good (1969) defined achievement means accomplishment of proficiency of performance in a given skill body of knowledge.

Stager (2007) defined achievement as the degree of proficiency or progress made by pupils in the mastery of school subjects.

Gopalacharyalu(1984) investigated in his study that Age and locality of student teachers were found to have significant influence on theory and total achievement.
Gopalacharyalu(1984), age and locality of student teachers were found to have significant influence on theory and total achievement.

Aparajitha Chowdhury, Chetana pati(1987) showed some positive indication towards the peers and the friends in developing the self-concept and its influence on the academic achievement of the elementary school children.

Babu Chandrabose(1987) illustrated that Pupils’ achievement in mathematics is related to their awareness in environmental mathematics in his study,” Secondary school pupils’ awareness of environmental mathematics and its relationship with their achievement in the subject”.

Sankarapppan (1992) investigated the urban pupils had a higher level of achievement that the rural pupils in English.

Lubna Shah (1993), in his findings showed a positive relationship between parent’s education and academic achievement of children.

Sudha .M (2004) founded students achievement is found influenced by the fifteen personal, familial, and Institutional variables viz sex, H.Sc instructional medium, family type, family income, Residence, College management, college kind, college locality, Departmental status, faculty strength, course system, class
strength, science exhibition, Assignments and library beyond working hours is one way or other, except the remaining four variables viz, writing after reading, part-time work, political party membership and family size.

Better academic climate in nuclear family.

Achievement is found higher among the undergraduate students.

- Who are female than male.
- Higher Secondary English medium than Tamil.
- Nuclear family than Joint family.
- Family income is adequate than whose is inadequate.
- Hostellers than day scholars aided and unaided this Government.
- Unaided than aided schools
- Unisex than mixed schools
- Rural than urban schools
- From UG & PG
- Adequate faculty strength than in a adequate faculty.
- Class strength 30 & above than 30 who participates in science exhibition than who do not who are given assignments and are not given permitted to the library beyond work hours than who are not permitted from the same

But achievement is found independent of the variables viz. writing after reading, part-time work, political party membership, Family size and course system.
Thamodharan.V. (2009) inferred that there is no significant difference in that academic achievement of Higher Secondary students with respect to variables Gender of the students, language of instruction, locality of the institutions and family income.

Lakshmi Shanmugam (2010) in her study every student teacher must have to evaluate their students subject knowledge that they taught at the time of training period. This has to be done by applying different kinds of tests. Among the various types of tests, achievement test is more relevant to evaluate the students’ performance.

Panneer Selvam (2011) described in his study the male and female students have the same level of achievement. The rural and urban school students have the same level of achievement. Tamil and English medium students have the same level of achievement. The students those who are studying in unisex school and those who are studying in mixed higher. Secondary School have the same level of achievement in biology. The students from nuclear and joint family have the same level of achievement.

**Achievement - Foreign Studies:**
Gouvias, Dionysios et.al.; (2012) in their study, they showed that the educational level and occupational status of parents represent two of the major factors affecting student performance--directly or indirectly--through their influence on previous achievement.

Marshall et.al.,(2012) Educational Assessment, Evaluation and Accountability, Using data from the CESSP project in Cambodia, this paper incorporates a standard decomposition framework to go beyond simple comparisons of average achievement levels over time in order to better understand the underlying dynamics of change. The results show that recent improvements in student achievement in Cambodia are attributable in part to changes in the composition of student cohorts, although there is some evidence of a tradeoff between increasing participation rates and average achievement. There is also some encouraging evidence that school quality is improving, especially in lower grades where the leveling off of participation is creating a policy window of opportunity.

Grigg et.al.,(2012) Students in the United States change schools often, and frequent changes are associated with poor outcomes along numerous dimensions. These moves occur for many reasons, including both promotional
transitions between educational levels and non promotional moves. Promotional student mobility is less likely than non promotional mobility to suffer from confounding due to unobserved factors. Using panel data from students enrolled in grades 3 to 8 in the Metropolitan Nashville Public Schools during the implementation of a major change in school attendance policies, this article investigates the potential influence of four types of school changes--including promotional student mobility--on test score growth in reading and mathematics.

Wang, Ze; Osterlind et.al., (2012), International Journal of Science and Mathematics Education Using the Trends in International Mathematics and Science Study 2003 data, this study built mathematics achievement models of 8th graders in four countries: the USA, Russia, Singapore and South Africa. These 4 countries represent the full spectrum of mathematics achievement, The relation between mathematics achievement and other student characteristics, along with the family, teacher and school variables, differed across the 4 countries. This suggests that self-concept of ability is a key variable for understanding achievement.

In this chapter, the investigator selected few socio-psychological variables which affect attitude, interest and motivation and academic achievement. In the succeeding chapter the methodology will be discussed.