

PSYCHOLOGICAL PERSPECTIVE OF MATHEMATICS PHOBIA

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ABSTRACT

Mathematics phobia is a serious concern in the field of mathematics education. Mathematics phobia causes poor achievement, avoidance to school even withdrawal from the education system and many more problems. So a pertinent question comes, what causes phobia in mathematics? This paper attempted to study the causes of phobia in mathematics from psychological perspective. Different theories reflected that there is no definite answer what causes phobia. However there are combinations of different factors like- physiological, social, cognitive and environmental may be at play.

Keywords: Anxiety, Phobia, Mathematics, Psychological- Theories.

Introduction:

Development of human resources and its maximum utilization are necessary for steady progress of civilization. Education is the key factor to build up modern nations and development of the people. Mathematics education is probably the most serious area of concern in science education among school children. Mathematical skills are essential to any person's success in technological field as well as non technical field like Business, Social Science, Behavioural Sciences, the Humanities and the Arts. Mathematical skills are also needed for common purposes of individual life. Mathematics is used for such routine activities as payment made for marketing, checking balance in different accounts, making family budget etc.

In India the goal of achieving universalization of elementary education is the area of central concern. Schooling is a legal right and mathematics being a compulsory subject of study, access to quality mathematics education is the right to every child.

Despite the enormous importance of mathematics education many students perform poor in mathematics. A large number of students are unable to pass the Board examination due to the inability of scoring minimum marks required to pass in mathematics. The trend in low scholastic achievement, rate of drop outs, failure in the examination, avoidance and many other causes are the areas of concern in connection with mathematics education in secondary schools.

Scholastic performance of an individual occupies an important place in the modern education system. High performance increases the confidence and self efficacy of the individual whereas failure not only creates a negative attitude towards education but also damage the self confidence. It is found that high achievers are not necessarily more intelligent than low achievers. Every child in the class room has within himself a considerable range of talent. Student's low performance is not necessarily for low intelligent. Stuart(2000), in his study observed that the ability to do mathematics is ninety percent mental attitude or confidence building and only ten percent is mathematical skill. Therefore a pertinent question comes, why the students differ in their performance in spite of similar educational facilities, teaching methodologies and environment?

Psychologists presumed that the students who perform poor in mathematics not necessarily due to his poor intelligence and ability, there may be something else at play. Mathematics phobia plays as an important role in this regard.

Objective of the study:

- i. To look after the findings of research studies related to anxiety and phobia in mathematics..
- ii. Find out the root cause of phobia based on psychological theories and relate them with mathematics phobia.

Some studies related to anxiety and phobia in mathematics:

- Koglmén & Warren (1978) viewed that anxiety in mathematics can influence students mathematical performance physically by affecting memory.
- Anxiety creates nervousness and inability to concentrate as found by Tobias(1978).

- Betz(1978) found a set of notable consequences of anxiety in mathematics; such as the inability to do mathematics, the decline in the mathematics achievement, the avoidance of mathematics courses, limiting the career choices and the negative feeling of guilt and shame.
- Anxiety is highly influenced by the social environment in which the individual lives and grows (Vygotsky,1978).
- Student's anxiety is highly influenced by primary teachers and hence teacher's anxiety should be under consideration in treating the anxiety of students(Williams,1988)
- Unrealistic goal setting promotes more anxiety.[Bhargava(1989)]
- When anxiety becomes very strong students try to avoid mathematics as observed by Hembree(1990). This avoidance of mathematics leads to limiting of career choices of the students.
- Fear and anxiety in mathematics causes under achievement in the subject.[Chel(1990)]
- The concern about doing well in mathematics and associated methods of assessment are the identified sources of anxiety .(McLeod,1992)
- There is an inverse relationship between academic achievement and level of stress as a whole [Ranganathan(1998)]
- Burns(1998) stated that " mathematics phobia is not genetic but highly contagious". A large number of parents have an attitude that mathematics is hard and not interesting subject, that puts the negative image about mathematics into their children accordingly children feel anxiety in mathematics.
- When anxiety or concern becomes strong it may interfere with performance as found by Wigfield & Meece(1998).
- Harper & Daane(1998) viewed that intellectual factors like learning style, persistence, self doubt etc. create anxiety in mathematics.
- Hadfield & Trujillo(1999) found that the attitude of parents sometime helps to develop anxiety in mathematics.
- Cornell(1999) identified key factor leading to anxiety in mathematics is its delink to real life. Students can not find the real utility of what they are learning. Learning becomes rote, leading to anxiety and phobia.
- The attitudes of teachers and methods of teaching are found to be a primary cause of anxiety in mathematics among the school children. Tobias mentioned that bad experience with the teachers of mathematics can foster anxiety in mathematics.
- Fiore(1999) stated that teachers and teaching of mathematics are known to be the roots of anxiety in mathematics in many cases. He also stated that the teachers having anxiety in mathematics easily and unknowingly pass their anxiety to the students.
- Fotoplos(2000) found the personality factors; such as low self esteem, shyness and intimidation are responsible agent for developing anxiety in mathematics among students. Gender of the students is widely mentioned as a significant factor of anxiety in mathematics. Various study mentioned that female are more anxious in mathematics than male.
- Kumar & Karimi (2010) found that the anxiety in mathematics has negative effect with mathematics performance and achievement though it has also been found that a degree of cognitive anxiety(worry and concern) may motivate students to try harder. Thus anxiety in mathematics needs to be given its due attention.

Observations related to the causes of anxiety and phobia in mathematics:

The following observations may be made based on the above mentioned findings

- Mathematics Phobia develops, in most cases, during early years of a child due to family and peers influence.
- Wrong method of teaching creates anxiety among students in many occasions.
- Students' attitude is a vital factor of causing anxiety. Findings of some studies indicate that the ability to do mathematics is ninety percent mental attitude and only ten percent cognitive skill.
- System of assessment of answer scripts (right or wrong answer, no partial marking) and limitation of test time are also responsible for causing anxiety.
- Phobia in mathematics is not genetic but highly contagious. Every negative comment to the subject, like; it is hard, boring, and abstract, useless etc. put a negative image about mathematics among the children. And this negative image is an important source of causing anxiety.

- Concern about doing well in the subject may motivate the child to work hard but when such concern becomes very strong it may have a negative effect on performance. Such negative performance helps to develop anxiety among the learners.
- Abstract nature of the subject, symbolic operations creates anxiety among few students.
- Students do not feel interest when they do not find the real utility of the subject. Delink of the subject to real life works as a source of anxiety.
- Mathematics myth like- women cannot do mathematics well, mathematics require high intelligence etc. may have a negative impact on attitude formation of the students towards the subject.

MAJOR THEORIES ON PHOBIA -DEVELOPMENT

In order to deal with the problems of anxiety and phobia in mathematics it is essential to know the theoretical background of developing anxiety and phobia. Here are the main theories and their implications to deal with the problem of mathematics phobia.

There are many theoretical approaches to anxiety and phobia. None of them are complete in itself but each of the theory helps to understand different aspects of anxiety and phobia in mathematics. The theories along with their implications in relation to anxiety and phobia in mathematics have been discussed below.

Biological theories of anxiety:

According to Biological theory mental disorders are caused by physiological factors. It states that there is a biological process associated with anxiety. Neuropsychologists have identified certain genetic factors that may play a role in the development of phobia. Eysenck(1967) suggested that individual differences in the experiences of anxiety may occur as a result of the inheritance of a particular genetic makeup. Seligman's(1971) theory of 'preparedness' in development of phobia suggests that as a result of evolutionary process man is biologically predisposed to develop fear due to conditioned of certain stimuli. Seligman believes this 'preparedness gene' may be passed on from generation to the next.

Although the research is still in its early phase, it is known that certain medications that affect the brain chemistry are helpful in treating phobia. Most of these treatments are intended to help relieve anxiety by maintaining the level of chemical called serotonin. A serotonin level that is too high or too low can cause both depression and anxiety.

Biological theories propose that individual differences should be given proper importance in dealing with and minimising anxiety and phobia in mathematics. This theory also suggests that mathematics is not a natural stimulus for phobia, therefore, as a preventive strategy of anxiety in mathematics one must guard against conditioning of learning mathematics which is neutral stimulus with the natural predisposed stimuli.

Psychoanalytic Theory (Freudian Theory)

According to this theory all human anxiety originates from the complex interplay of the psychic forces of Id, Ego & Super-Ego. Id is the most primal and instinctive part of the mind and is the basis of stress, fear, anxiety, phobia etc. The role of super-ego is to make value judgement of the task/behaviour, the individual performed. The ego is the rational moderator between Id and Super Ego. Tusk of Ego is to make a balance between the desire of Id and criticism of Super Ego. Phobia develops as a result of anxiety reactions of the Id that have been repressed by Ego. It indicates that the phobia that are showing at present are not the original subject of fear, rather there are some other sources generated by the desire of Id.

Psychoanalytic treatment involves exploring the organization of the personality and reorganizing it in a way that addresses the deep conflicts. According to the principle of psychoanalysis, curing the phobia is only possible by rooting out and solving the original conflict.

So, if a child is punished by the teacher for not doing mathematics-tasks then this free floating anxiety may be attached to mathematics. Not only the child but also some of his peers who have observed the punishment may be victim of mathematics anxiety.

Neo Freudian Theory

This theory is of view that human is largely a consequence of social influences. This theory regards that 'Primary anxiety' develops not in birth but later; as the child realizes that he depends upon his parents. Anxiety is aroused due to actual or potential frustration. If a child misbehaves, the parents might withdraw affection and support. This threat impels the child to conform to the parents' expectations but anxiety develops due to suppression.

Child's anxiety increases due to over expectation of the parents which are beyond the ability level of the child. Most of the parents think that mathematics is the most important subject and the child must have to learn this for betterment of his future career. But anxiety develops in mathematics if the child failed to learn mathematics up to the expectation of his parents.

Behavioural Theory

Watson and Rayner(1920) demonstrated that anxiety can be acquired through a process of classical conditioning. Mower(1947) suggested a two factor theory for the development and maintenance of anxiety. Initially fear develops through classical conditioning and subsequently the person learns to reduce his fear by avoidance. This second kind of learning is called 'instrumental conditioning' and the response of avoidance is acquired and maintained because it reduces anxiety and therefore immediately reinforcing. Once avoidance becomes established as the means of coping with problems it is used repeatedly. Therefore, the anxiety may be generalized and the confidence of the individual decreases gradually. Therefore, according to this theory phobia develops due to stimulation generalization process. Stimulus plays an important role while teaching mathematics. Fear of performing poor may lead to anxiety and gradually when it becomes tiger it turns to phobia, the irrational fear. So teacher needs to be cautious about such stimulus generalization while teaching. If we check the fear when it is at classical conditioning level then phobia can't be developed.

Cognitive Social Learning Theory

This theory lays importance of learning principle together with the role of individual thought and reasoning for the development of anxiety disorder. Bandura(1969) opined that fear and anxiety are learned. He mentioned four possible mechanisms for this learning.

- i. Fear may be learned by classical conditioning
- ii. Watching some others undergo discomfort, punishment, or pain as a consequence of their behaviour may create anxiety to others.
- iii. Due to symbolic instruction anxiety may develop. Such as, if elders or teachers say to child that mathematics is a difficult subject then child may develop anxiety in mathematics.
- iv. Due to symbolic logic a person may infer or deduce that something is dangerous, accordingly anxiety develops. If mathematics teacher is a dreadful man then students deduce that mathematics is a fearful subject.

Cognitive Learning Theory

Cognitive theorists viewed that, it is not events which cause anxiety rather it is individual's interpretation of those events. Ellis(1976) proposed that the primary causes of human distress are certain 'core irrational' beliefs. Ellis opined that individual is happiest when he is able to establish important life goal and purpose, and he actively pursues them.

This theory suggests that faulty mathematics curriculum which lacks clear objectives i.e. which fails to set clear goal of learning mathematics before the child and faulty evaluation procedure which fails to make the child know how far he has proceeded towards and how far he is behind the goal, may make the child directionless and help to develop anxiety in mathematics. This theory also suggests that encouragement from the part of teachers and parents to the children in relation to the activities of mathematics may be effective for the betterment of performance and works as preventive agent of anxiety and phobia in mathematics.

CONCLUSION: There is no unique and definite cause of phobia in mathematics. However there are many factors (based on the theories of phobia) that may be responsible for developing phobia in mathematics. A combination of different factors like- physiological, psychic, social, cognitive and environmental may be at play .

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