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Motivation towards mathematics depends on mathematical-intellectual ability

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Abstract:

Purpose of the present study was to find out the relation of mathematical- intellectual ability to motivation towards mathematics among 6th -8th grade students. All the 6th-8th grade school students of the 2018 & 2019 academic session of Durgapur KC High School in south 24 parganas were the population of this study. Of these, two hundred ninety two (292) early Adolescent students aged 11-13 years were selected as samples through simple random sampling method. Two tests were administered on participants throughout two successive 2018 and 2019 academic session. Student's motivation towards mathematics was measured by Motivation Orientation Scales (MOS). Student's intellectual ability was measured by Raven's standard progressive matrices (SPM). All gathered data was analyzed by using correlation method in SPSS software. The results showed that there is moderate positive relationship between mathematical- intellectual ability and motivation towards mathematics. Students with high or average intellectual ability have task or ego oriented motivation and students with low intellectual ability have no motivation i.e. work avoidance.

Key words: Effort, Intellectual ability, Mathematical ability, Motivation towards Mathematics.

1. Introduction-

1.1 Weiner's Attribution Theory (Bernard Weiner 1980, 1992):

Attribution theory that influence academic motivation. When a student (learner) succeeds or fails in a task, he or she investigates and identified the attribution for that success or failure. The student attribute his or her success or failure to factors to maintain a positive self image i.e. able to feel as good as possible about himself or herself. The factors that the students attribute for their success and failure affect the future tendency to perform these same behaviours. The basic principle of attribution theory is it applies to motivation is that "a person's own perception or attributions for success or failure determine the amount of effort the person will expend on that activity in the future." According to Weiner, four factors are attributed as the cause of success or failure: i) Ability ii) Effort iii) Task difficulty iv) Luck. Again, the cause of the success or failure can be analysed in term of three dimensions: i) either internal or external ii) either stable or unstable iii) either controllable or uncontrollable.

Table1: Weiner's dimension:

Stability	Locus of Control	
	Internal	External
Stable	**Ability**	Task Difficulty
Unstable	**Effort**	Luck

Internal factors like ability (stable) and effort (unstable) originate within learners and external factors like task difficulty (stable) and luck (unstable) exist in environment. An internal factors can be controllable (learners can control their *effort* by trying harder) or uncontrollable (most students cannot easily change their basic *intellectual ability*.).

Both internal factors of math learners i.e. intellectual ability (uncontrollable, stable) and effort (controllable, unstable) are more essential for success in mathematics performance.

Table 2: Ability vs. effort

Ability	Effort	Performance outcome	Success or Failure		Dimension of Motivation
High	*High*	High	Success		*Task orientation*
Average	*High*	Moderate	Success Or Failure		
High	High-Average-Low (relative to other persons)	Moderate	Success Or Failure		*Ego orientation*
Low	Low	Low	Failure		Work avoidance

Generally students who have a high level of mathematical ability and effort perform a high level of success in mathematics and they attribute their success in mathematics to either intellectual ability or effort. Their self confidence builds up and they get high motivation in next math tasks. Sometimes if they try hard but fail to achieve own goal they attribute to the luck for this failure. Many math learners with average level of mathematical ability put in a lot of effort and if they succeed they believe their effort was enough then they get motivated in future by working hard in mathematics. But if they fail after trying again and again they attribute to the task difficulty or luck. Those students having high or average ability always done math by hard working using a lot of continuous effort known as task oriented students who enjoy mastery competence.

Again, those students who provide relatively less effort despite their high level of intellectual ability may get success or failure depending on peer's ability (competition among peers). If they are successful, they attribute to ability to show their superior ability than others as the cause behind it. If they fail, they do not agree that their effort was less, but they make excuses for task difficulty and luck. Yet, many students analysed self-effort that was less as a result he or she became unsuccessful. In later they will increase their effort to avoid inferiority among peers and will become successful once again. Above students are ego oriented and their success depend on peers competition, external reward and punishment.

Those students whose intellectual ability are low and have no effort, their math performance is very poor and in later they gradually lose their motivation towards mathematics. They attribute to insufficient ability for math performance. They gradually develop self perception that they have no or less mathematical capacity. This self-perception will formed negative attitude towards mathematics and will make them as work avoidance.

We conclude that more effort of math problem solver must lead to more success in math but effort will improve performance up to the limit of ability. So ability has a limit to the extent to which effort can increase performance and difficult tasks require more ability (Nicholls. John. G, 1978).

1.2 Nicholls's developmental stages & concept of ability (nicholls,1990):

There are four levels of differentiation of ability and effort-

i) Effort or outcome is ability (3-5 years)-

Effort, ability and performance outcomes are imperfectly differentiated as causes and effects. Nursery students aged 3-5 years who try harder are seen as smarter even if they get lower score. Early childhood students who get higher score are also seen as smarter, are suppose to try harder even if they don't try harder.

ii) Effort is the cause of outcomes (6-8 years)-

Effort and outcomes are perfectly differentiated as cause & effect. Efforts are the main cause of outcomes. 1 to 3 grade primary students aged 6-8 years who try equally hard is expected to lead to same outcome, regardless of ability in their middle childhood stage.

iii) Effort and ability are partially differentiated (9-10 years)-

Effort is not the only cause of performance outcomes. Equal outcomes followed by different efforts arise the concept of ability as capacity. 4 to 5 grade primary students aged 9-10 years who try same level of hard may not have equal outcome because of ability but this principal are not followed systematically.

iv) Ability is capacity (12-13 years)-

Ability and effort are completely separated in 6 to 8 grade upper primary students aged 11-13 in their early adolescence stage . Ability that is conceived as capacity, is the main cause of outcomes. If ability is low, there may some limit to outcome, regardless of effort level. If ability is high, there may increase the effect of efforts on performance. so, the effect of efforts is constrained by ability level.

" Students aged 10-12 years begin to view intellectual ability as a capacity rather than as a set of skills and knowledge and to view ability as more fixed and stable trait" (Nicholls & Miller 1984). Nicholls (1979) found that "by age 12, students perceived themselves as having high ability, they attribute their successes to high ability (rather than luck or effort) and they attribute also their failure to luck (rather than ability)."

1.3 Achievement goal theories of motivation (Nicholls 1984, 1989; Dweck 1986):

There are two distinctive achievement goals based on one's perceived ability or competence framework: *task and ego goals* (Nicholls, 1984, Nicholls, 1989) or, in other words, *mastery and performance goals* states (Dweck, 1986). Also, there are three dimension of motivation according to goal theory like *task orientation* (desire for understanding), *ego orientation* (desire for

superiority) and *work avoidance* for individuals' judgement their own ability or competence. *Task orientation or involvement(Task & mastery goal)* "is the goal of improving one's skill or gaining insight or knowledge and the beliefs that, in order to be successful, work hard, attempt to understand math tasks and collaborate with peers"(Nicholls,1984). An individual's internal sense of ability can be judge high or low in relation to his or her past performance & knowledge. Task involved students who already gain a sense of competence from improvement in personal mastery see more effort as leading to more mastery and higher ability. Achievement motivation of children in mathematics depends on task behavior (Middleton and spanias, 1999). The second dimension, *ego orientation (ego & performance goal)* " is defined as the goal of establishing one's superiority over others and believes that success in mathematics requires attempts to beat others and superior ability"(Nicholls, 1989). The ability can be judged as capacity in relation to others. So, gain in mastery alone does not indicate high ability in this context. Individuals who gain a sense of competence from demonstrating superior performance relative to others are considered to be ego involved. To demonstrate high capacity, one must achieve more with equal effort or less effort than do others for an equal performance. The third dimension, "*Work avoidance*, entails the goal of not working hard"(Duda & Nicholls, 1992).

1.4 Implicit theories of intelligence (Carol Dweck, 1999):

Entity (Performance goal) Vs. incremental (Mastery goal) theory of intelligence:

Carol Dweck developed student's implicit theory of intelligence that refers to one's fundamental underlying beliefs regarding whether or not abilities or intelligence can change.

Two different mindsets regarding intelligence beliefs were identified by Dweck. The entity theory of intelligence refers to an personal belief that abilities are fixed trait to achieve performance goal. On the other hand, the incremental theory refers intelligence's beliefs that abilities & intelligence are malleable trait to achieve mastery goal and it can be improved by working hard through continuous efforts. So,

Intelligence = ---------% ability + ----------% effort.

Entity students give more important on their ability or capacity than effort. For those students, if perceived ability belief is high, the perceived possibility for mastery is also high, if low, there is little perceived possibility for mastery known as learned helplessness. So students with entity beliefs are more likely to attribute their failure to a lack of ability rather than effort. On flip side, students holding incremental intelligence belief give more weight to effort than ability. When initial ability to perform a task is low, there is a high perceived possibility of mastery for those students. So, incremental students are more likely to attribute their failure to a lack of effort rather than ability.

Subjective views on intelligence have been identified as a strong predictor of student's learning motivation. Individuals with incremental mind set believe that intelligence can increase with training. They have tendency to try harder after setbacks and get high intrinsic motivation for success. "Self enhancement strengthened the effect of incremental beliefs on student's effort after a perceived failure. Self criticism strengthened the effect of incremental beliefs on student's effort after a perceived success"(Wei-Wen Chen, et al., 2017).

1.5. Mathematical - intellectual ability:

The core component of mathematics subject is problem solving process using two strategies like algorithm or heuristics (Kilpatrick, 2016). The problem solving process is the learners' brain storming to find out the relationship between different part of the math problem and gets final answer through step by step. According to Gardner's multiple intelligence theory, problem solving is done by logical mathematical intelligence of problem solver using their constant efforts and critical thinking.

This intelligence consists of the capacity to analyze problems logically, carry out mathematical operations. In Howard Gardner's word, it entails the ability to detect pattern, reason deductively and think logically. It is reasoning capabilities, abstract patterns of recognition, scientific thinking & investigation, and the ability to perform complex calculation (Gardner, 1983).

"Mathematical intelligence is composed by: 1) ability to master principles of logical thinking and inference.2) ability to visualize problems and /or relation. 3) analogical, heuristic thinking and posing related problems. etc".(Juter & Sriraman, 2011,pp.49-50). According to Krutetskii (1976)," mathematical ability is the ability to process mathematical information (i.e. logical thought, generalization of mathematical objects, relations and operations, the ability to curtail the process of mathematical reasoning and flexibility in mental processes)".

Suitable branches of mathematics are studied by different graded students in their different developmental stages of ability are shown as follows:

Table 3: Ability developmental stages-

Classes	Developmental Stage (Age)	Nicholls's Ability developmental stage (Age)	Piaget's Cognitive Stage	Branches
Nursery/ Pre-Primary	Early Childhood (2-6 yrs)	*Effort or outcome is ability.* (3-5 yrs)	*Pre Operational Stage*	Elementary Mathematics
Primary (Grade 1 to 5)	Middle Childhood to	*Effort is the cause of outcome.* (6-8 yrs)	*Concrete Operational Stage*	Arithmetic
	Late Childhood (6-11 yrs)	*Effort and ability partially differentiated.* (9-10 yrs)		
Upper Primary (Grade 6 to 8)	Early Adolescence (12-14 yrs)	*Ability is capacity.* (12-13 yrs)	*Formal Operational Stage*	Arithmetic Algebra Geometry
Secondary (Grade 9 to10)	Middle Adolescence (14-17 yrs)			Arithmetic, Algebra, Geometry (Theorems & Construction),Statistics, Mensuration

In nursery class, early childhood learners solve elementary mathematics with their non-logical thinking, non-reversible, transductive reasoning ability at their pre-operational stage.

Those students when promoted to primary class have already entered in their middle & late childhood age which is known as concrete operational stage; learn basic arithmetic with concrete intelligence. They develop an ability to think logically about concrete or real world events. Concrete intelligence is demonstrated through logical and systematic manipulation of symbols related to concrete objects. According to Piaget (1964), they have abilities to conserve number, substance, length, area, weight, volume. This reversible operational thinking may also be accelerated through training and practice. Those children develop the ability to use inductive reasoning which involves from a specific observation to a general principle (Piaget, J., 1952).

In upper primary class, the early adolescent student starts to learn algebra beside their Arithmetic and Geometry. In formal operational stage, abstract intelligence is demonstrated through the logical use of symbols related to abstract concepts. So their abstract thinking is going to start, they begin to explore more abstract concepts of numeric relationship, representation and symbolism in Algebra course. Beside, deductive logical reasoning ability (General principle to Specific) also get developed throughout this stage (Piaget, J., 1952). "Young brains have inbuilt ability to learn, using counting rules, working with concrete as well as abstract concepts, employ different strategic for addition, work with complex procedures (Ginsburg et al. 2008)". At Piaget's early formal operational stage (12-14 yrs.), the students perceive their belief that *ability is capacity* known as Nicholls's last stage of ability development.

Now, 6 to 8 grade early adolescent students have developed higher order mathematical ability which consists of different abilities such as logical ability, inductive & deductive ability, abstract thinking ability, and fluid reasoning ability.

1.6. Motivation towards learning mathematics:

i) Mathematics task orientation, Intrinsic Motivation- Task involved students always solve math problem with different difficulty level by their own interest and effort which drive them to get pure enjoyment. They believe that only hard work is the main key for success. They attribute their effort rather than ability for both success and failure. They perform mastery in mathematical knowledge & skill developing experience from previous tasks. They like to collaborate with peer rather than competition. Intrinsic motivation is maintained by person's autonomy and competence that is the aspect of mathematical proficiency (Deci & Ryan, 1985). *ii) Ego orientation, Extrinsic Motivation*- Ego involved students attempt math tasks by their own ability but relative effort with respect to others (peers) for enjoying easy superiority. They like to compete among peers for avoid inferiority.

iii) Work avoidance & No Motivation- Most of the students have no motivation towards learning mathematics for their inadequate intellectual capacity or mathematical ability.

2. Purpose of research-

According to West Bengal Education Portal, in most of govt. aided schools in West Bengal, the marks obtained by students in mathematics are very poor. Most of students get higher marks in all other subjects but their score low in mathematics. This is because they don't love mathematics. They avoid to do mathematics and suffer from math anxiety. Most of the students have no motivation towards learning mathematics. Gradually their school results are poor because the foundation of maths is not strong enough.

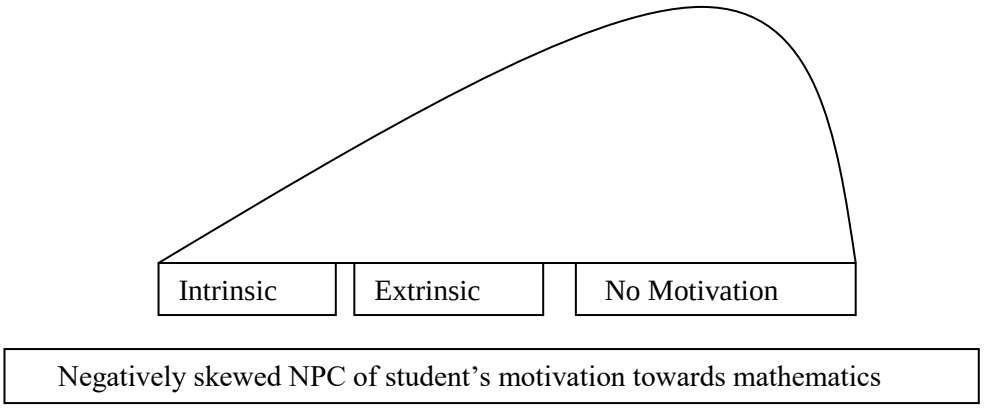

Figure: 1

Is their ability responsible for their lack of motivation? It needs to be verified.
In this study, the researcher tried to find out the relation of intellectual ability to motivation towards mathematics among 6th -8th grade students.

3. Methodology-

3.1. Participants -
All the 6th-8th grade school students of the 2018 & 2019 academic session of Durgapur KC High School in south 24 parganas were the population of this study. Of these, two hundred ninety two (292) early Adolescent students aged 11-13 years were selected as samples through simple random sampling method.

3.2. Procedure-
Two tests were administered on participants throughout two successive 2018 and 2019 academic session.

3.3. Measures-
3.3.1. Student's motivation towards mathematics was measured by Motivation Orientation Scales (MOS) developed by Nicholls (Nicholls et al., 1988b). The 16 items regarding task orientation (9 items), ego orientation (4 items), work orientation (3 items) are used in this five point scale ranging from strongly agree to strongly disagree. Each item start as " I feel really pleased in maths when....." followed by a statement reflecting task involvement, ego involvement and work avoidance. Maximum score is obtained by this scale is 80 marks.

3.3.2. Student's intellectual ability was measured by Raven's standard progressive matrices (SPM, Raven J.C., 1938). This scale is the best for measuring "g" or general intellectual ability. Mathematical ability is best conceptualized as the innate ability to recognize and exploit hidden structure in given matrix. In this study, this scale assessed the different non verbal abilities such as logical reasoning , analogical reasoning , abstract & fluid reasoning of upper primary students in their formal operational stage. The scale has total 60 problems divided in 5 sets of matrices as set- A, B, C, D & E with 12 matrices which gets difficult with increasing level. Sum of all correct response are added together to get a row score of the subject. Row score is converted into percentile point which is used to classify abstract intelligence of the subject.

3.4. Statistical analysis-
All gathered data was analyzed by using correlation method in SPSS software.

4. Result

Table-4 : Descriptive statistics of abstract intelligence (N=292)

Mathematical ability	*Classification of Abstract Intelligence*	*IQ percentile score*	*N*
High & Average (N= 112)	Grade-I "Intellectually superior"	95% - 100%	6
	Grade-II "Definitely above the average in intellectual capacity"	II+ 90% - 95%, II- 75% - 90%	24 (II+ 10, II- 14)
	Grade- III "intellectually average"	III+ 50% - 75% , III- 25% - 50%	82 (III+ 39, III- 43)
Low (N = 180)	Grade-IV "Definitely below the average in intellectual capacity"	IV+ 10% - 25% IV- 5% - 10%	87 (IV+ 45, IV- 42)
	Grade- V " Intellectually impaired"	5% - 10%	93

Objective-1

Testing of H_0 -1: There is no significant relationship between motivation towards mathematics and mathematical ability by 6th - 8th grade school students.

Table -5: Pearson's correlations coefficient, Mean and Standard deviation-

	Motivation towards Mathematics	Mathematical ability	Mean	Std. Deviation
Motivation towards Mathematics	1.00		39.379	12.72401
Mathematical ability	0.497**	1.00	24.54%	6.80098
N= 292 **- 0.05 level of significance				

From table-5, it is evident that mean of motivation towards mathematics is 39.379 and standard deviation is 12.72401, mean of mathematical ability is 24.54 percentile and standard deviation is 6.80098. Also table-5 showed that Correlation value (r) between motivation towards mathematics and mathematical ability is 0.497. It is significant at 0.05 level. The null hypothesis is rejected. So there is moderate positive relationship between motivation towards mathematics and mathematical- intellectual ability.

Objective-2

Testing of H_0 -2: In motivation towards mathematics, there is no significant difference between Task & Ego orientation and Work avoidance of students with different mathematical ability (High & Average Vs. Low ability).

Table-6: Mean, SD, t test value-

Independent variable	Dependent variable	N	Mean	Standard Deviation	t test value	Significance at 0.05 level
High & Average ability	Task & Ego orientation	112	59.88	11.347	0.722	Significant. H_0 -2 is rejected.
Low ability	Work avoidance	180	20.45	4.621		

From table-6, Out of 292 numbers 6th -8th grade school students, 112 are students with high & average ability and 180 are students with low ability. Mean of task & ego orientation and work avoidance are 59.88 and 20.45 respectively. t test value is 0.722 and p value is 0.535 ($p > 0.05$). Hence H_0 -2 is rejected. Alternative hypothesis is accepted. So it can be concluded that there is significant difference between task & ego orientation and work avoidance of students having different level of mathematical ability (High & Average Vs. Low ability). Students with high or average intellectual ability have task or ego oriented motivation and students with low intellectual ability have no motivation i.e. work avoidance.

5. Discussion

With a minimum level of intellectual ability, a math solver can understand how to solve a specific math problem. The greater the critical, deductive and logical thinking capacity, the easier it is to analyze the problem. Eventually when the ability is high, students are able to easily understand the difficult tasks. Only when a learner develops abstract thinking ability he or she becomes efficient in learning algebra. Students are eager to solve math problems only when they can understand it. After solving successfully, their interest, curiosity and self enjoyment will increase. As a result, they will put more effort on learning math and practice more daily. Gradually their self confidence, autonomy, competence will increase and after a certain period of time, those students will become intrinsically motivated. Their mathematical schema will also be expanding. That means the minimum ability is very important to arouse motivation in them and if the effort is given within the specific ability range, the motivation increases. It has been supported by previous researcher Nicholls. John. G, 1978.

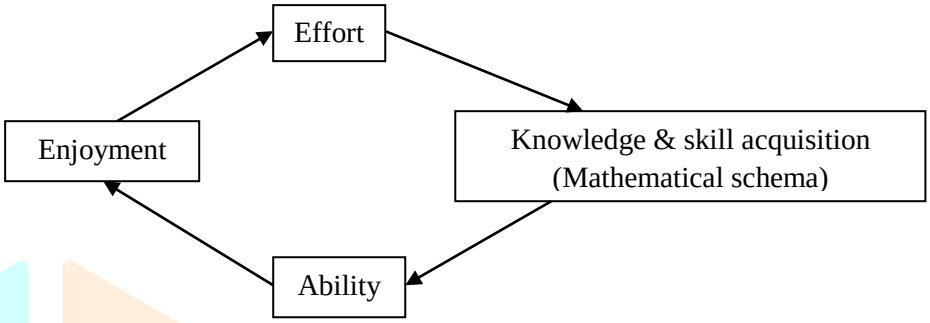

Figure 2: Cyclic process of motivation

On the other hand, if there is no minimum ability in the students, they will repeatedly fail to understand mathematics. As a result, interest and curiosity will never grow and they will not want to give efforts in learning mathematics. They will refrain from doing algebra and will lose self confidence. As a result, they will develop a work avoidance tendency and a negative attitude towards mathematics. If the student's intellectual ability is really low then the difficulty level of math tasks has to be reduced, then he or she will be successful and gain motivation by increasing his or her efforts. But mathematics syllabus has specific task difficulty so if the ability is not above the specified level then math performance will not be at all.

The Arithmetic teaching method in curriculum in rural primary schools of West Bengal is not satisfactory. For the lack of enjoyment in teaching learning process, the ability of children to learn maths is not improving properly in rural schools. In comparison, the mathematics teaching learning methods of CBSE & ICSE schools in urban areas are more better. Always there is a pressure of homework from those schools so children are bound to practice arithmetic daily. Therefore mathematical schemas are strongly developed in children from primary level in CBSE & ICSE School and their mathematical abilities continue to increase along with interest. Uneducated parents in rural areas cannot take care of mathematical learning of their child in proper way, so their mathematical ability do not grow up because the foundation of mathematics is not strong enough from their early age. On the other hand, the opposite situation occurs in the case of children of educated parents in urban areas. Above events regarding ability development is supported by incremental theory of intelligence.

Children of uneducated parent in rural areas who are first generation learners have comparatively less intellectual ability (fluid intelligence) than children of educated parent in urban areas. It is called genetically predisposition nature of intelligence. In most of cases, the children of parent with high intellectual ability may have high mental ability. It supports entity theory of intelligence.

With age, early adolescents develop abstract thinking ability (Piaget), as well as self perceived intellectual belief (Nicholls & Dweck). Those who develop a high level of abstract thinking ability begin to become proficient in algebra course and ego or task involvement can be noticed in them. At this age, those who do not develop self efficacy and self confidence due to the very slow development of abstract reasoning ability tend to avoid mathematics learning.

Bibliography-

[1] Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum.

[2] Duda, J. L., & Nicholls, J. G. (1992). Dimensions of achievement motivation in schoolwork and sport. *Journal of Educational Psychology*, 84, 290-299.

[3] Dweck, C.S.(1986). Motivational processes affecting learning. American Psychologist, 41,1040-1048.

[4] Dweck, C.S. (1999). *Self-Theories: Their role in motivation, personality and development.* Philadelphia: Taylor & Francis.

[5] Gardner, H.(1983). *Frames of mind : Theory of multiple intelligence*, New York. Basic Books..

[6] Ginsburg, H.P., Cannon, J., Eisenband, J., & Pappas, S. (2008). Mathematical thinking and learning. *Back well handbook of early childhood development* (pp. 208-229) Blackwell publishing Ltd.

[7] Juter, K., Sriraman, B.(2011). Does high achieving in mathematics = gifted and/or creative in mathematics? In B.Sriraman & K.H.Lee (Eds.), *The elements of creativity and giftedness in mathematics* (pp. 45-66). Rotterdam: Sense Publishers.

[8] Kilpatrick , J.(2016). Reformulating : Approaching mathematical problem solving as inquiry. In P.Felmer, E. Pehkonen, & J.Kilpatrik (Eds.), *Posing and solving mathematical problems- Advances and new perspectives* (pp. 69- 82). Switzerland: Springer International Publishing.

[9] Krutetskii, V.A. (1976). *The psychology of mathematical abilities in school children.* Chicago, I L; The University of Chicago Press.

[10] Middleton, James A., & Spanias, Photini A. (1999). Motivation for achievement in mathematics: Findings, generalizations, and criticisms of the research. *Journal for Research in Mathematics Education,* 30(1), 65-88.

[11] Nicholls, J. G.(1978) The Development of the concepts of efforts and Ability, perception of academic attainment, and the understanding that difficult tasks require more ability. *Child Development* 1978,49,800-814.

[12] Nicholls, J.G. (1979). Development of perception of own attainment and causal attributions for success and failure in reading. *Journal of Educational psychology*,71,94-99.

[13] Nicholls, J.G. (1984) Achievement motivation conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, 91,328-346.

[14] Nicholls, J.G. & Miller, A. (1984). Conceptions of ability and achievement motivation. In R. Ames & C. Ames (Eds). *Research on motivation in education* (Vol. 1-pp. 39-73). New York. Academic Press.

[15] Nicholls, J. G. (1989). The competitive ethos and democratic education. Cambridge, MA: *Harvard University Press*.

[16] Nicholls, J.G. (1990). What is ability and why are we mindful of it ? A developmental perspective. *competence considered*.

[17] Piaget, J.(1952). *The origins of intelligence in children.* New York: International Universities Press

[18] Piaget, J.(1964). Development and Learning, *Journal of Research in Science Teaching*,3.

[19] Weiner, B. (1972). Attribution theory, achievement motivation , and the educational process. *Review of educational research*, 42(2), 203-215.

[20] Weiner, B.(1985). an attributional theory of achievement motivation and emotion. *Psychological review*, 92(4),548.

[21] Wei-Wen Chen, Ching-Chen Chen, Chia-Liang Dai (2017). Is the incremental theory of intelligence a key to students' motivational engagement? The moderating effects of self-enhancement and self criticism. *Interactive learning Environments.* DOI:10.1080/10494820.2017.1402061