

Problem Solving Ability of Cognitively High Intelligent Adolescents

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This study is aimed at independent and interaction effects of emotional intelligence and hemispheric dominance of tasks on problem-solving ability of adolescent subjects. It has been hypothesized that adolescents with high emotional intelligence would be better problem-solvers than those with low emotional intelligence and anagram-problems involving ambidextrous thinking would be solved faster than those involving unidextrous thinking either of left or right brain. It has also been expected that there would exist true joint effect of emotional intelligence and nature of task (hemispheric dominance) on problem-solving ability of subjects. A final sample of 120 cognitively high intelligent adolescent students aging 16-18 years and studying in 10th or 11th class, equally drawn from high and low emotional intelligence groups was randomly assigned to either of three hemispheric dominance groups i.e., unidextrous (left brain) thinking, unidextrous (right brain) thinking, and ambidextrous (left + right brain) thinking. Each group was given a list of 10 anagrams, related to the respective hemispheric dominance of thinking, to be solved one by one. Average solving time of the 10 anagrams was considered as the criterion. The finding confirmed the research hypotheses.

Keywords: Problem-solving ability, Emotional intelligence, Hemispheric dominance

One has to deal with numerous problems in day-to-day life because of which the field of problem-solving presents a perennial challenges to the psychologists. Johnson-Laird (1994) asserts problem-solving involves thought as a conscious process and thinking involves the internal representation and manipulation of external world through mental models or representation of that world.

Intelligence is a concept to explain why some people perform better than others on cognitive tasks. Most experts agree that intelligence is the capacity for adaptive goal directed behaviour (Howard, 1993). Cognitive intelligence refers to ability to concentrate and plan, to organize material, to use words and to understand, assimilate and interpret facts. As such, it is concerned with verbal,

spatial, visual, and mathematical skills. It gauges how readily people learn new things, focus on tasks and exercise, retain and recall objective information, engage in reasoning process, manipulate numbers, think abstractly as well as analytically and solve problems by application of prior knowledge. The above concepts clearly correspond to left-brain activity. Cognitive intelligence is considered to be positively correlated with problem-solving skills.

Mayer and Salovey (1993) define emotional intelligence as the ability to monitor one's own and others' feelings and emotions, to discriminate among them and use this information to guide one's thinking and action that promotes emotional and intellectual growth. In other words, it is a set of skills that

enables us to make our way in the complex world. They are personal, social, and survival aspects of overall intelligence. Bradberry and Greaves (2005) assert that emotional intelligence is “something” in each of us that is a bit intangible. It defines how we manage behaviour, navigate social complexities, and make personal decisions that achieve positive results. Emotional intelligence is a set of skills hypothesized to contribute to the accurate appraisal and expression of emotion in oneself and in others, the effective regulation of emotions in self and others, and the use of feelings to motivate, plan and achieve desirable goals in life. Bar-On (1997) defined emotional intelligence as “an array of non-cognitive capabilities, comprehensives, and skills that influence one’s ability to succeed in coping with environmental demands and pressure”. Sharma et al. (2009) and Mandal (2011) have emphasized theoretical and cultural perspectives of emotional intelligence. A close examination of all major theoretical conceptions of emotional intelligence reveals the fact that the components of emotional intelligence do play considerable roles when it comes to solving a problems of different types in various domains of life. The rising level of depression, stress and suicidal tendencies is of a major concern in society. These tendencies are seen in individuals who are having unrealistic perception of self, low frustration tolerance, inability to manage good interpersonal relationships, who are not able to identify reasons of their present state of life, therefore, are unable to find possible solutions to their problems. Such persons think negatively; are less hopeful about any positive outcome in any encounter; have no confidence in their abilities and are unable to seek help from others to solve problems of their lives. Thus, they feel victimized inadequate, bitter and resentful, and feel nothing in life is under their control. They find themselves unable to solve problems of their lives and resort to suicidal tendencies, depression, anxiety, stressful situations.

Thus, low emotional intelligence skills lead to poor problem-solving ability making life of an individual miserable. Some studies have highlighted the key role of emotional intelligence in problem-solving ability (Alex & Ajawani, 2010).

People have markedly different ways in which they perceive and assimilate information, take decisions and solve different problems. In problem-solving process, the nature of task or the type of problem being solved by the person plays an important role in determining his problem-solving performance. Clinical evidence has shown that the two sides of brain suggest that different sides of brain control different modes of processing i.e., left and right hemispheres of brain control different modes of thinking. They differ in their information processing abilities and propensities. People have a preference for one or the other of these modes. Based on this, there can be one way of categorization of problems i.e., (1) problems involving dominance of left brain thinking (unidextrous left), (2) Problem involving dominance of right brain thinking (unidextrous right), (3) Problem involving a combination of left and right brain thinking (Ambidextrous, or whole brain thinking). Left brain thinking is logical, analytical, sequential, rational, objective, deals with the situation in parts, is dominant for verbal processing, while right brain thinking pattern is random, intuitive, holistic, focuses on subjective aspect, involves synthesis, specializes in visuo-spatial processing, expression and perception of emotion. According to Faste (1994), “... ambidextrous thinking is a kind of thinking which is a combination of both of these modes of thinking. It involves the integrated use of capacities of both cerebral hemispheres and all the activities that people perform are benefited by the use of ambidextrous or whole brain thinking. It essentially enriches brain functioning to a superior level of heightened awareness. Eviatar et al. (1997), Hasbrooke and Chairellow (1998), Marks and Hellige

(1999, 2003), Mickels and Reuter-Lorenz (2004), and Singh and O'Boyle (2004) observed that equal involvement of processing or a combination of processing by both cerebral hemispheres (ambidextrous thinking) enhanced performance in comparison to unidextrous processing i.e., processing either by left hemisphere (left brain thinking) or right hemisphere (right brain thinking).

The present investigation intends to explore relationship between problem-solving ability and its certain determinants i.e., emotional intelligence and nature of task (hemispheric dominance). The specific problems and relevant hypotheses are as below:

(1) The first problem of the research is whether emotional intelligence plays any role in problem-solving ability of subjects?

It is hypothesized that, the subjects with high emotional intelligence would be better problem-solvers than those with low emotional intelligence i.e., would take comparatively lesser time to solve anagrams.

(2) The second problem of the present research is whether hemispheric dominance of tasks exerts any effect on problem-solving ability of subjects. In other words, the problem is whether different type of problem tasks i.e., anagrams involving unidextrous (left brain) thinking, unidextrous (right brain) thinking, and ambidextrous (left and right brain) thinking require differential amount of time to be solved?

It is expected that anagram problems involving ambidextrous thinking would be solved faster than those involving unidextrous thinking either of left or right brain.

(3) The last problem of the research pertains to interaction effect of emotional intelligence and nature of task (hemispheric dominance) on problem-solving ability.

It is assumed that there would exist genuine interaction effect of emotional

intelligence and nature of task (hemispheric dominance) on problem-solving ability of subjects.

Method

Experimental Design:

A 2x3 factorial design was used to study independent and interaction effects of emotional intelligence and nature of tasks on problem-solving ability of subjects.

Sample:

A final sample of 120 subjects with cognitively high intelligence was drawn from initial random sample of 1400 school going adolescents of Raipur city aging 16-18 years and studying in class XI or XII. One-half (n=60) of these subjects belonged to high emotional intelligence group and another one-half (n=60) were of low emotional intelligence. Out of these 60 subjects in each emotional intelligence group one-third (n=20) were randomly assigned to either of the three type of tasks, i.e., problems involving unidextrous (left brain) thinking, problems involving unidextrous (right brain) thinking, and problems involving ambidextrous (left and right) brain thinking.

Tool:

Rao's Indian Adaptation of Culture Faire Intelligence Test Scale III was used to assess the level of cognitive intelligence of the subjects. Emotional Intelligence Scale constructed and standardized by Ajawani et al. (2002) was used to assess emotional intelligence level of subjects. Three lists of 10 anagrams each involving unidextrous (left brain) thinking, unidextrous (right brain) thinking, and ambidextrous (left and right brain) thinking were prepared to assess problem-solving ability of subjects (Vohra & Ajawani, 2007).

Procedure:

Data were collected in three steps in the first step, a list of English medium schools of Raipur city was prepared and 15 school were

selected randomly. An intelligence test was administered on 1400 randomly selected and initial sample of male and female students studying in 11th or 12th class and aging 16-18 years. Subjects scoring above Q_3 on this test were considered as cognitively high intelligent.

In the second step, all these subjects were administered an emotional intelligence scale and again on the basis of Q_1 and Q_3 statistics emotionally low intelligent (below Q_1) and emotionally high intelligent (above Q_3) were selected and then 60 subjects were randomly selected in both the groups as the final sample.

Lastly, in the third step, one-third of these finally selected 60 subjects in each emotional intelligence group were randomly given the list of 10 anagrams involving either unidextrous (left brain) or unidextrous (right brain) or ambidextrous (left and right brain) thinking to read so to evoke specific hemispheric dominance thinking. One anagram from the list of 10 anagrams was given at a time to be solved by the subject. A maximum time of 18 seconds was given to solve an anagram. The anagrams which remained unsolved were also assigned the time of 18 seconds. Average solving time of the 10 anagrams was considered as the criterion of problem-solving ability of the

subjects and as the basis for further calculations. The experiment was conducted in individual setting.

Results and Discussion

The obtained data were analyzed with the help of F-statistics. Hartley test of Homogeneity of Variance was used to ascertain whether observations were randomly drawn from normally distributed population and all of which had same variance.

(i) Role of Emotional Intelligence in Problem-Solving

It is clear from Table 1 that, average problem-solving time of emotionally high intelligent subjects ($M = 9.0008$ seconds) is lesser than that of emotionally low intelligent subjects ($M=10.7716$ seconds). The obtained significant F-ratio ($F= 32.43, p<.01, df 1, 114$) provides empirical ground to retain research hypothesis and to conclude that emotionally high intelligent students are truly better problem-solver than emotionally low intelligent students. This fact is very pertinent in view that all the subjects were of high cognitive intelligence. It shows that it is emotional intelligence that contributes more to problem-solving ability than cognitive intelligence alone.

This better problem-solving ability of

Table 1: Average Anagram Solving Time (In Sec) of Subjects in Various Subgroups

Nature of Task (Hemispheric Dominance)	High Emotional Intelligence	Low Emotional Intelligence	M
Unidextrous (L)	n = 20	n = 20	Mr1 = 11.0125
	M = 10.5225	M = 11.5025	
	$T^Mx2= 57.26$	$T^Mx2= 51.54$	
Unidextrous (R)	n = 20	n = 20	Mr2 = 11.0506
	M = 10.29875	M = 11.80245	
	$T^Mx2= 52.91$	$T^Mx2= 55.52$	
Ambidextrous (L + R)	N = 20	n = 20	Mr3 = 7.5956
	M = 6.18125	M = 9.00995	
	$"x2 = 54.1$	$"x2 = 59.37$	
M	Mk1= 9.0008	Mk2 = 10.7716	9.8862

emotionally high intelligent students in comparison to emotionally low intelligent students may be attributed to their high emotional intelligence abilities specially on assertiveness, self-regard, independence, self-actualization, interpersonal relationship, problem-solving, reality testing, flexibility, stress tolerance, impulse control, happiness, and optimism dimensions. Bar-On (1997) too asserts that emotional intelligence is an array of non-cognitive abilities, competencies and skills that influence one's ability to succeed in coping with environmental demands and pressure. Leadbeater et al. (1989), too, found that high assertive people were having better social problem-solving skills. High self-regard leads a person to face his problems with appropriate self-confidence along with genuine consideration of his own limitations, which enables him to seek success in such problem situations (Pajaras & Miller, 1994; Aristico et al., 2003). They also concluded that potentiality, enthusiasm and vigor altogether of a highly self-actualized person lead him to be more successful in various life-situations. Asarnow and Callan (1985), and Leadbeater et al. (1989) assert that a person with good interpersonal relationship skills is at a better foundation of social skills to resolve conflicts and problematic social situations in comparison to a person who shows poor ability of interpersonal relationships.

Nezu and Ronan (1985), Schotte & Clum (1987), Schotte et al. (1990), Marx et al. (1992), Thompson and Heller (1993), Sadowski and Kelly (1993), Christian et al. (1994), and Williams et al. (2005), observed that a person high on reality testing dimension of emotional intelligence was able to identify and delimit problems with appropriate attention leading him to correct solution. Contrarily, a person with poor reality testing ability not only failed to identify and delimit problems but also tended to be depressive and dominated by suicidal tendencies due to

continued failures in social conflicting and problem situations which in turn affected his problem-solving ability in general run of life. Bouchard (2003) assert that a flexible person is comfortable and solution prone person. Because of his flexible attitude, free from rigidity, such person has the readiness to react towards the problem situation as per its demand in an un-whimsical manner, leading him to be a better problem-solver.

The results of some research studies suggest that stress laden and impulsive people have difficulty in various stages of problem-solving (Nezu & Ronan, 1985; Schotte & Clum, 1987; D'Zurilla & Sheedy, 1991; Marx et al., 1992; Sadowski & Kelly, 1993; Thompson & Heller, 1993; Christian et al., 1994, and Davilla et al., 1995; Mandal & Kumar, 2008). Isen et al. (1987), Bar-On (1997), Overskeid (2000), Jonier et al. (2001), and Grawitch et al. (2003) assert that happy people have a realistic perception of themselves and they set their goals which give their lives a meaning and keep them physically and mentally alert. It is this contended and realistic attitude of happy people which lead them to deal with problems of their lives in an effective manner. Contrary to this, an unhappy person is unable to cope with his life's problems due to his discontented attitude and lack of drive. The positive attitude full of hopefulness predisposes an optimist to deal with problem situations in a sustainable manner which ultimately brings success in his life, while, the "lost hope attitude" of a pessimist hinders him to perform in the conditions of adversities or in problem situations and consequently he is proved to be a failure in his life (Isen et al., 1987; Overskeid, 2000; Jonier et al., 2001; and Grawitch et al., 2003).

Bar-On (1997) asserts that problem-solving, as a dimension of emotional intelligence, is an ability to identify and define problems as well as to generate and implement potentially effective solutions. It is

associated with being conscientious, disciplined, methodological, and systematic in approaching problems. This skill is linked with a desire to do one's best and to confront problems rather than to avoid them. People who are better problem-solvers identify obstacles that might prevent them from attaining their goals in a family, social, or workplace setting and also apply logical and rational solutions to overcome them. Contrary to this, people who lack this ability are not able to identify what is the real obstacle in their path to solution and hence how to overcome it. They become confused and stuck while facing problems and turn out to be unsuccessful in their personal and professional lives. Alex & Ajawani (2010) observed a highly positive correlation between problem-solving dimension of emotional intelligence and problem-solving ability.

(ii) Effect of Nature of Task (Hemispheric Dominance) on Problem-Solving

It is clear from Table 1 that, average problem-solving time to solve anagrams involving unidextrous (left brain) thinking is 11.0125 seconds, of that involving unidextrous (right brain) thinking is 11.0506 seconds and that of involving ambidextrous thinking is 7.5956 seconds. The obtained F-ratio for these differences ($F = 54.28$, Table 2) is significant at .01 level of significance. It can be concluded that, problem-solving of tasks involving ambidextrous thinking is truly better than that of tasks involving either unidextrous (left brain) or unidextrous (right brain) thinking.

Problem-solving is a process which involves organizing and analyzing the given data and facts, planning the various possible causes of action and choosing one correct alternative. Whole brain thinking or ambidextrous thinking approach can be very useful while solving problems as it brings the benefits of all four quadrants i.e., quadrant A reviews data and facts as well as provides

realistic viewpoint about the problems at hand, quadrant D provides a holistic view of situation and possible creative ideas and imagination, while quadrant C helps us to have a 'feel' of situations and people involved, and quadrant B thinking style helps us to have a procedural, systematic, step by step method to solve a problem and implement the solution. Faste (1994) too assert that ambidextrous thinking essentially enriches brain functioning to superior level of heightened awareness. The finding of the present research is in consonance to those of Eviatar et al. (1997), Hasbrooke and Chairellow (1998), Markes and Hellige (1999, 2003), Mickels Reuter-Lorenz (2004), and Singh and O'Boyle (2004).

(iii) Interaction Effect of Emotional Intelligence and Nature of Task (Hemispheric Dominance) on Problem-Solving Ability

The obtained interaction F-ratio ($F = 3.15$, Table 2) is significant at .05 level of significance for 1 and 114 degrees of freedom. It can be concluded that, difference between emotionally high and low intelligent subjects in solving the anagram list involving unidextrous (left brain) thinking (0.98), or unidextrous (right brain) thinking (0.504) is considerably different from that involving the anagram list involving ambidextrous (left + right brain) thinking (0.829).

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