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Assessment of Cognitive development of adolescents of Himachal Pradesh

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Abstract

A sample of 150 adolescents in the age group of 12-18 years of two selected blocks (Panchrukhi and Bhawarna) of Kangra district was selected with the aim to assess cognitive development of adolescents of Himachal Pradesh. Two standardized scales namely Group test of General Mental Ability (Jalota 1976) and Cognitive Capabilities Test (Padmanabhan 2008) were employed to judge the cognitive development. The collected data were analyzed statistically using t test, Karl Pearson correlation matrix and regression analysis. The results of the study revealed that adolescents were average in general mental abilities and performed partial cognitive capabilities tasks. The mean values of general mental ability and cognitive capabilities of the respondents were found non- significant between the male and female respondents.

Key words: Mental ability, cognitive capabilities and adolescent girls.

Introduction

Cognition means mental or inner processes and products of the mind that lead to "knowing". It includes all mental activities attending, remembering, symbolizing, categorizing, planning, reasoning, problem solving, creating, fantasizing, thinking, perceiving and choosing. Jean Piaget, a famous Swiss psychologist and theorist, placed adolescents in a cognitive stage called formal operational thought. In the ages 11 and 15 years Piaget believed that thought became more abstract more idealistic, and more logical than a child's. According to Piaget, "The adolescent is an individual who is capable of building and understanding ideas or abstract theories and concepts. The adolescent is able to discern the real from the ideal, and to become passionately engaged by abstract concepts and notions. Adolescents begin to think of their world in new ways, including the ability to "think about thinking.

The changes in how adolescents think, reason, and understand can be even more dramatic than their physical changes. From the concrete, black-and-white thinkers they appear to be one day, rather suddenly it seems, adolescents become able to think abstractly and in shades of gray. They are now able to analyze situations logically in terms of cause and effect and to entertain hypothetical situations and use symbols, such as in metaphors, imaginatively (Piaget 1950). Adolescent girls tend to feel more confident about their reading and social skills than boys, and adolescent boys tend to feel more confident about their athletic and math skills (Eccles *et al.* 1999).

Materials and methods

Standardized scales namely Group test of General Mental Ability (Jalota 1976) and Cognitive Capabilities Test (Padmanabhan 2008) were used to judge the cognitive development of 150 adolescents in the age group of 11-19 years of two selected blocks (Panchrukhi and Bhawarna) of Kangra district was selected with the aim to assess cognitive development of adolescents of Himachal Pradesh. The level of Group test General mental ability was measured on a nine point scale on various items and score value was given for this test by giving one mark for each correct answer for set of 20 items of five categories and adding of all the correct score values, poor, very poor, dull, low, average, bright, superior, very superior, and excellent with respect to Group test of General mental ability of adolescents were examined. Cognitive capabilities test (CCT) has a maximum score of 125 and scoring was done by giving one mark for each correct response and one bonus mark for systematic classification /combination in each combinational thinking and one mark for correct hypothesis and maximum 3 marks for writing / improvising an experiment correctly to verify a hypothesis which were analyzed and represented in frequencies and percentages.

Results and Discussion

Table 1: Frequency distribution of respondents on the basis of general mental ability

General Mental Ability	Boys (n=75)	Girls (n=75)	Total (n=150)
Dull	-	9 (12.00)	9 (6.00)
Low	10 (13.33)	8 (10.66)	18 (12.00)
Average	30 (48.00)	28 (37.34)	58 (38.66)
Bright	20 (26.67)	17 (22.66)	37 (24.67)
Superior	12 (16.00)	10 (13.34)	22 (14.66)
Very superior	3 (4.00)	2 (2.66)	5 (3.34)
Excellent	-	1 (1.34)	1 (0.67)
Total	75 (100.00)	75 (100.00)	150 (100.00)

Note: figures in parenthesis indicate percentages of respondents.

General Mental Ability of respondents: The data on the general mental ability in table no-1 revealed that half of male respondents (48.00%) and one third of female (37.34%) respondents fell in the average (38.66%) category of general mental ability followed by 24.67 percent of respondents fell in bright category of general mental ability (26.67% of male and 22.66% of female), 14.66 per cent fell in superior category (16.00% male and 13.34% female), 12.00 per cent of respondents fell in low category (13.33% of male and 10.66% of female), 6.00 percent in dull category (12.00% of female only), 3.34 per cent in very superior category (4.00% of male and 2.66% female) and only 0.67 per cent in excellent category (1.34% of female only) of general mental ability.

Cognitive Capabilities of respondents: A critical examination of data in areas of cognitive capabilities tasks on various Schemes of thought of respondents presented in table 2.

Table 2: Distribution of respondents in the areas of cognitive capabilities

Schemes of Thought	Male (n=75)	Female (n=75)	Total (N=150)
Combinational thinking			
Failure / partial combinations	7 (9.33)	8 (10.66)	15 (10.00)
Random / repeated combinations	37 (49.34)	39 (52.00)	76 (50.66)
Complete and systematic combinations	31 (41.33)	28 (37.34)	59 (39.34)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Class inclusion			
No logical groupings	9 (12.00)	17 (22.66)	26 (17.33)
At least one logical grouping	39 (52.00)	34 (45.34)	73 (48.67)
All logical groupings	27 (36.00)	24 (32.00)	51 (34.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Proportionality			
No logical proportional thinking	2 (2.66)	3 (4.00)	5 (3.33)
Partial proportional thinking	37 (49.34)	39 (52.00)	76 (50.67)
Complete proportional thinking	36 (48.00)	33 (44.00)	69 (46.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Time and Motion			
Incorrect judgment	17 (22.66)	13 (17.33)	30 (20.00)
Partial correct judgment	33 (44.00)	42 (56.00)	75 (50.00)
Fully correct judgment	25 (33.34)	20 (26.67)	45 (30.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Co-ordinate systems			
Failure to draw the figures	20 (26.66)	13 (17.33)	33 (22.00)
Partial correct figures	37 (49.34)	46 (61.34)	83 (55.33)
Fully correct figures	18 (24.00)	16 (21.33)	34 (22.67)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Geometrical sections			
Failure to draw the figures	-	-	-
Partial correct figures	3 (4.00)	6 (8.00)	9 (6.00)
Fully correct figures	72 (96.00)	69 (92.00)	141 (94.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Conservation of area			
No conservation	7 (9.33)	11 (14.66)	18 (12.00)
Partial conservation	49 (65.34)	51 (68.00)	100 (66.66)
Complete conservation	19 (25.33)	13 (17.34)	32 (21.34)
Total	75 (100.00)	75 (100.00)	75 (100.00)
Conservation of weight			
No conservation	9 (12.00)	3 (4.00)	12 (8.00)
Partial conservation	19 (25.33)	20 (26.66)	39 (26.00)
Complete conservation	47 (62.67)	52 (69.34)	99 (66.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)

Conservation of volume			
No conservation	5 (6.66)	7 (9.33)	12 (8.00)
Partial conservation	45 (60.00)	46 (61.34)	91 (60.66)
Complete conservation	25 (33.34)	22 (29.33)	47 (31.34)
Total	75 (100.00)	75 (100.0)	150 (100.00)
Formulation and testing of hypotheses			
Failure formulate and test the hypotheses	3 (4.00)	11 (14.66)	14 (9.33)
Formulation of hypotheses only	44 (58.66)	41 (54.67)	85 (56.67)
Formulation and partial testing of hypotheses	21 (28.00)	18 (24.00)	39 (26.00)
Formulation systematic testing of hypotheses	7 (9.34)	5 (6.67)	12 (8.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)

Note: figures in parenthesis indicate percentages of respondents.

Combinational thinking: In this areas of cognitive capabilities tasks, 49.34 per cent of male respondents and 52.00 per cent of female respondents were able to perform on random/repeated combination tasks and 41.33 per cent and 37.34 per cent of male and female respondents respectively were able to perform on complete and systematic combinations tasks whereas 9.33 per cent of male and 10.66 per cent of female respondents were able to perform on failure/partial combinations tasks. Overall, data showed that in the areas of cognitive capabilities tasks half of the respondents i.e. 50.66 per cent of respondents were able to perform on random/repeated combination followed by 39.34 per cent of respondents were able to perform on complete and systematic combinations and only 10.00 per cent of respondents were able to perform on failure/partial combinations tasks.

Class inclusion: On the class inclusion tasks 12.00 per cent and 22.66 per cent of male and female respondents respectively performed on no logical groupings and little more than half i.e. 52.00 per cent of male respondents performed on at least one logical grouping and 45.34 per cent of female respondents were able to perform on at least one logical grouping. However 36.00 per cent and 32.00 per cent of male and female respondents respectively were able to perform on all logical groupings. At least one logical grouping was done by half of respondents (48.67%) and all logical groupings were done by 34.00 per cent of respondents, whereas least of the respondents performed on no logical grouping (17.33%).

Proportionality: No logical proportional thinking tasks were performed by 2.66 per cent of male respondents and 4.00 per cent of female respondents followed by 49.34 per cent of male and 52.00 per cent of female respondents performed partial proportional thinking tasks, whereas 48.00 per cent and 44.00 per cent of male and female respondents respectively performed complete proportional thinking tasks. Half of the respondents (50.67%) completed the tasks with partial proportional thinking and 46.00 per cent of respondents completed the proportional thinking tasks and very few (3.33%) respondents completed the tasks with no logical proportional thinking.

Time and Motion: Incorrect judgment tasks were able to perform by 22.66 per cent of male respondents and 17.33 per cent of female respondents and 44.00 per cent and 56.00 per cent of male and female respondents respectively were able to perform on partial correct judgment tasks, whereas 33.34 per cent of male respondents and 26.67 per cent of female respondents were able to perform on fully correct judgment tasks. Half of respondents (50%) completed partial correct judgment tasks, fully correct judgment tasks were done by 30.00 per cent of respondents and incorrect t judgment were preformed by 20.00 per cent of respondents.

Co-ordinate Systems: In this co-ordinate system schemes, 26.66 per cent of male and 17.33 per cent of female respondents failed to draw the figures and 49.34 per cent of male respondents and 61.34 per cent of female respondents performed the tasks on partially correct figures. However, only 24.00 per cent and 21.33 per cent of male and female respondents respectively were able to draw fully correct figures. Under coordinate systems schemes, partial correct figure tasks were completed by little more than half i.e. 55.33 per cent of respondents, whereas, fully correct figures were completed by 22.67 per cent of respondents and similar percentage of respondents could not draw the figures.

Geometrical Sections: In the areas of cognitive capabilities tasks, 4.00 per cent of male respondents and 8.00 per cent of female respondents were able to perform on partially correct figures whereas majority of the male and female (96.00% of male and 92.00% of female) respondents were able to perform fully correct figures. In these sections fully correct figures drawing were completed by majority of the respondents (94.00%) and rest (6.00%) could complete partially correct figures drawing.

Conservation of Area: Majority of the male and female respondents performed partial conservation of area tasks (65.34% of male and 68.00% of female), whereas 25.33 per cent and 17.34 per cent of male and female respondents respectively completed the conservation of area tasks. However, 9.33 per cent of male respondents and 14.66 per cent of female respondents could not complete the conservation of area tasks. Majority of respondents (66.66%) performed partial conservation tasks followed by 21.34 per cent of respondents completed conservation of area tasks whereas 8.00 per cent respondents were unable to perform on conservation of area tasks.

Majority of respondents (66.00%) completed conservation of the tasks, 26.00 per cent of respondents completed the tasks partially and 8.00 per cent of respondents were unable to accomplish the tasks on conservation of weight.

Conservation of Volume: Maximum of male (60.00%) and female (61.34%) respondents completed the tasks partially and 33.34 per cent of male and 29.33 per cent of female respondents completed the tasks of conservation of volume whereas only 6.66 per cent of male and 9.33 per cent of female respondents could not perform the tasks on conservation of volume.

Tasks on partial conservation of volume were completed by majority of respondents (60.66%) and 31.34 per cent of respondents completed the tasks of conservation of volume. However only

8.00 per cent of respondents could not perform on the tasks conservation of volume.

Formulation and Testing of Hypotheses: More than half of male respondents (58.66%) and female respondents (54.67%) formulated the hypotheses only and 28.00 per cent of male and 24.00 per cent of female respondents were able to perform on formulation and partial testing of hypotheses whereas 9.34 per cent of male respondents and 6.67 per cent of female respondents were able to perform on formulation of systematic testing of hypotheses. However only 4.00 per cent of male respondents and 14.66 per cent of female respondents failed to formulate and test the hypotheses. On overall data more than half of respondents (56.67%) were able to formulate hypotheses, 26.00 per cent respondents were able to formulate hypotheses and partially testing of hypotheses and 9.33 per cent of respondents could not perform these tasks, however only 8.00 per cent of respondents were able to formulate systematic testing of hypotheses. Li *et al.* (2008) examined the associations between academic performances and cognitive functioning.

Mean score of General mental ability and Cognitive capabilities: The results of the score of General mental ability and Cognitive capabilities is shown in table 3.

Table 3. Distribution of respondents on the basis of Cognitive Ability

Sex /Cognitive ability	Male		Female		Standard error of differences of mean	t-value
	Mean	Standard deviation	Mean	Standard deviation		
General mental ability score	60.49	10.26	58.70	14.89	±2.08	0.85 NS
Cognitive capabilities	80.77	13.30	79.28	16.08	±2.41	0.61 NS

*Significant at the 5% level, NS-non significant

General mental ability: The mean score of General mental ability in case of male and female respondents was found to be 60.49 and 58.70 respectively with the Standard error of differences of mean of general mental ability score ±2.08 and this difference was non-significant.

Cognitive capabilities: The mean score of cognitive capabilities of male and female respondents was found to be 80.77and 79.28 respectively with the Standard error of differences of mean of general mental ability score ±2.41 which was non-significant difference.

From the present study it was found that adolescents were average in general mental abilities and performed partial cognitive capabilities tasks. The mean values of general mental ability and cognitive capabilities of the respondents were found non- significant between the male and female respondents. To enhance cognitive ability, conducive

environment should be provided to the adolescents in schools as well as at home.

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