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Assessment of Cognitive Capabilities at School Level

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Abstract: ***Cognitive abilities are brain-based skills we need to carry out any task from the simplest to the most complex way. They have more to do with the mechanisms of how we learn, remember, problem-solve, and pay attention rather than with any actual knowledge. Cognitive refers to the inner processes and products of the mind that lead to knowing. . According to Piaget around age 11 young people enter the formal operational stage, in which they develop the capacity for abstract scientific thinking whereas concrete operational children can operate on reality. The objective was to assess cognitive capabilities of government and private school students. An Ex- post facto research was done on 120 students from government and private school during 2013-2014 sessions. Multistage random sampling technique was used for drawing samples from various schools. The data was analysed by using SPSS version 20. Cognitive capabilities test during transition period (by P. Vasundhara 2007) was used to assess the cognitive capabilities of individual student. The scale had three parts and each part has to be filled in assigned time duration. There exists a large variation between government and private school student cognitive capabilities. Significant differences were noticed between cognitive capabilities of government and private school students.***

Keywords: cognitive capabilities, government school, private school, transition period school students.

1. Introduction

Cognitive abilities are brain-based skills we need to carry out any task from the simplest to the most complex. They have more to do with the mechanisms of how we learn, remember, problem-solve, and pay attention rather than with any actual knowledge. Cognitive refers to the inner processes and products of the mind that lead to knowing. It includes all mental activity - attending remembering, symbolizing, categorizing, planning, reasoning problem solving creating and fantasizing. According to Piaget around age 11 young people enter the formal operational stage, in which they develop the capacity for abstract scientific thinking whereas concrete operational children can operate on reality. In other words, they no longer concrete things and events as object of thought but can come up with new, more general logical rules through internal reflection. As Piaget's theory indicates, around age 11 young adolescents can analyze the logic of proposition regardless of their content. Formal operational adolescents can operate on operations" (innelder Piaget 1955/1958).The cognitive development age 6 to 14 years". The years between 6 and 14—middle childhood and early adolescence—are a time of important developmental advances that establish children's sense of identity. (1)

Evidence from a slew of surveys in a number of developing countries including India show that learning outcomes of students in private schools, as measured by test scores, is on the average better than government schools. In most of these studies, the private school advantage remains even after controlling for a large set of observable child, family, school and teacher characteristics (LEAPS, 2007; Goyal 2006a and b; Kremer and Muralidharan, 2006; Tooley and Dixon, 2006; Kingdon, 1996a and b). Private schools not only do better but also provide learning at a much lower unit cost (Tooley and Dixon, 2006). There is a clear need for reforming the government school system. The set of reforms advocated range in focus from making teachers and schools accountable for performance to making government schools compete for students with private schools. (2)

Developmental and educational theorists have discussed the value of the child development knowledge base for teachers throughout the past century. However, actual educational practice throughout this time period has been modeled on conceptions of learning and development defined by either the behaviorist tradition (Brown, 1994) or by extreme biological views such as entity ideas that intelligence is fixed or maturationist views that children develop on their own.(3)

In Piaget & Inhelder (1958) one is presented with a scale by which the level of different degrees of understanding of science concepts, and the intellectual level of the children working on them are described in one and the same terms. Thus in working on the Pendulum problem children at the mature concrete level (2B) can make observations based on simple causal thinking, and do find the effect of length. But because they confound the variables of weight and angle they only describe the phenomena. At the early formal level (3A) they have an idea about controlling variables, but may control the variable they are trying to test, and do not go further toward a solution. At the mature formal level (3B) they can find and prove that neither weight nor angle of swing affect the rate of swinging by designing and reasoning from controlled experimentation.(4)

In view of the above facts this study was carried out with objective: To assess cognitive capabilities of government and private school students.

2. Materials and Methods

An ex-post facto research design done on 120 sample of existed various government and private schools belonging to 6th-8th standard during 2013-2014 sessions. Out of which each were selected by using multistage random sampling. Included criteria for the study were the subjects belong to 10-13 years of age and studying in class from 6-8 standards. To cover total number of students from each class percentage were drawn for selection i.e. (lottery methods). Absent students are understood excluded from the present study at investigation time. The data was analysed and result drawn by using SPSS version 20. Tools used were a scale i.e. cognitive capabilities test during transition period: CCT-T (by P. Vasundhara 2005) and techniques are given below:
The cognitive capability test consists of 3 parts. First part is divided into 10 questions, second part into 12 questions and third part into 03 questions respectively. The maximum score is 125 and every part had repeat scoring of marks i.e. 63, 44 and 18 correspondingly. (5)

The scoring is calculated on the following criteria:

A)	*Discriminatory Index range (top group and bottom group)*	*0.10 to 0.66*
B)	Difficulty value range	14% to 65%
C)	Qualitative score	2B late concrete period, 2B/3A (transition period), 3A (early formal operational stage).
D)	Quantitative score	63+44+18=125

3. Results

3.1 Quantitative Assessment of cognitive capabilities according to type of school:

Table 1: Combinatorial thinking-class inclusion (Part I) :

S. No.	Schemes of thought	Type of school					
		Government N=60		Private N=60		t value	P value
		Mean	S.D	Mean	S.D		
1.	Combinatorial thinking	13.12	2.906	28.55	4.172	23.514	.077
2.	Class Inclusion	3.22	1.250	11.13	2.432	22.427**	.000

The table 1, depicts that Private school student has highest mean value(28.55±4.172) for combinatorial thinking in private school and the lowest mean value(13.12±2.906) in government school. The highest mean value (11.13±2.432) for class inclusion in private school, and the lowest mean value (3.22±1.250) in government school.

Table 2: Proportionality- co-ordinate system (Part-2):

S. No	*Schemes of thought*	*Type of school*					
		Government N=60		*Private N=60*		*t value*	*P value*
		Mean	S.D	Mean	S.D		
1.	Proportionality	4.33	2.245	13.90	2.915	20.140*	.012
2.	Time and Motion	1.33	1.160	2.245	1.145	6.338	.739
3.	Conservation of area	0.92	0.809	3.40	1.564	10.923**	.000
4.	Geometrical section	0.95	1.185	2.30	1.344	5.836	.961
5.	Co-ordinate system	1.72	1.209	3.32	1.790	5.790**	.001

The table2 shows that Private school student has highest mean value(3.40±1.564) for conservation of area and the lowest mean value(0.92±0.809) in government school. The highest mean value(3.32±1.790) for co-ordinate system in private school, and the lowest mean value(1.72±1.209) in government school.

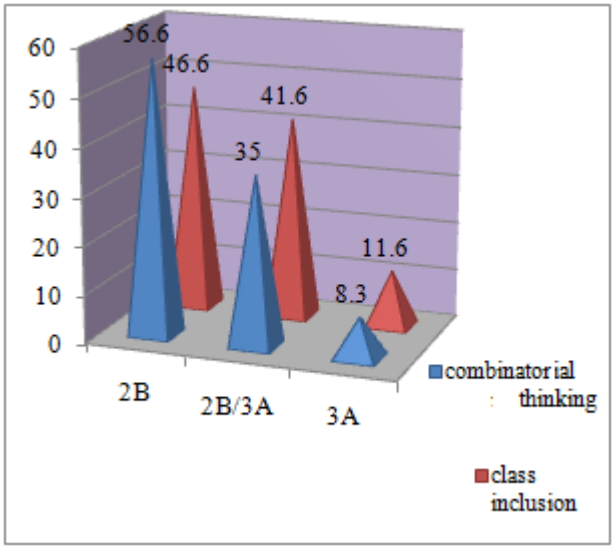
Table 3: Conservation of weight- testing of hypotheses (Part-3) :

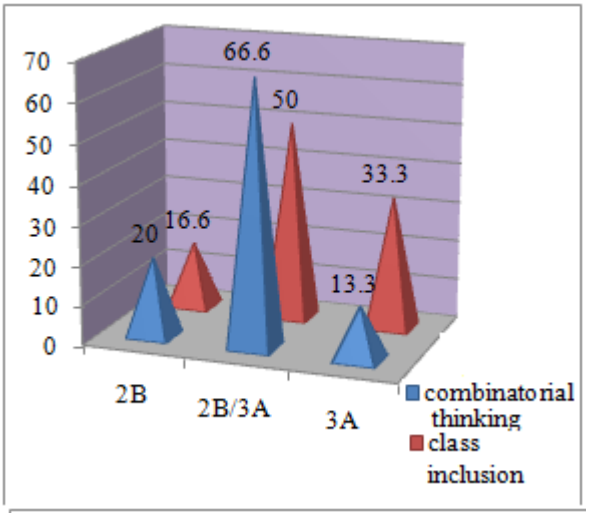
S. No.	*Schemes of thought*	*Type of school*					
		Government N=60		*Private N=60*		*t value*	*P value*
		Mean	S.D	Mean	S.D		
1.	Conservation of weight	1.55	.891	1.80	1.005	1.442	.331
2.	Conservation of volume	1.87	2.012	2.50	1.864	9.224**	.003
3.	Formulating and testing hypotheses	1.47	1.081	6.87	1.652	21.19**	.002

The table 3 indicates that Private school student has highest mean score(1.87±2.012) for conservation of volume and the lowest mean value (1.864±9.224) in government school. The highest mean value (1.652±21.19) for formulating and testing hypotheses in private school, and the lowest mean value(1.47±1.081) in government school for the formilatig and testing hypotheses.

4. Qualitative cognitive capabilities assessment according to type of school.

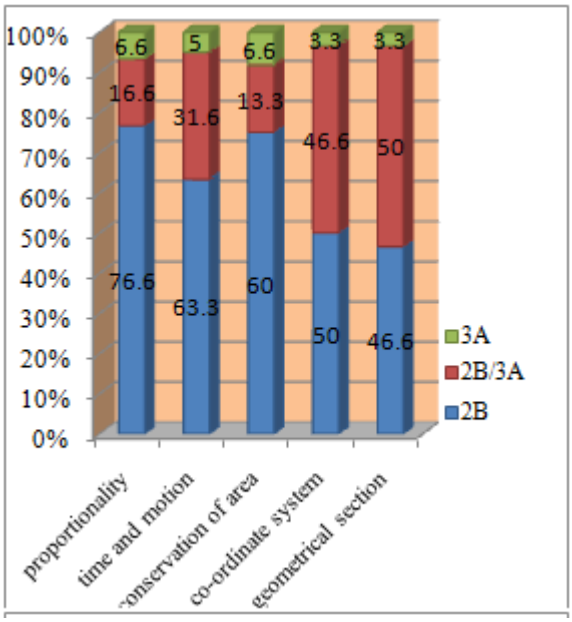
2.1 Distribution of respondents according to their belonging stages in government and private schools (Part1)





Stage 2B: Late Concrete Operational period
Stage 2B/3A: Transition period
Stage 3A: Early formal Operational stage

In government school (56.6%) student failure partial combinations so, they belong to late concrete operational stage, (8.3%) have complete and systematic combinations and hence belongs to early formal stage and (35%) students have random /repeated combination so they are in transition period. Whereas in private school (8.3%) students failure partial combination so belong to late concrete operational stage and (66.6%) students have random repeat combination so that they belonging to transition period. There are (41.6%) students of government school and (16.6%) students of private school have no logical grouping so they belong to late concrete operational stage. There are (46.6%) students of government school and (50%) students of private school at least one logical grouping so they belong to transition period ,whereas (11.6%) of government school students and(33.3%) of private school students have all logical grouping they belong to early operational stage.



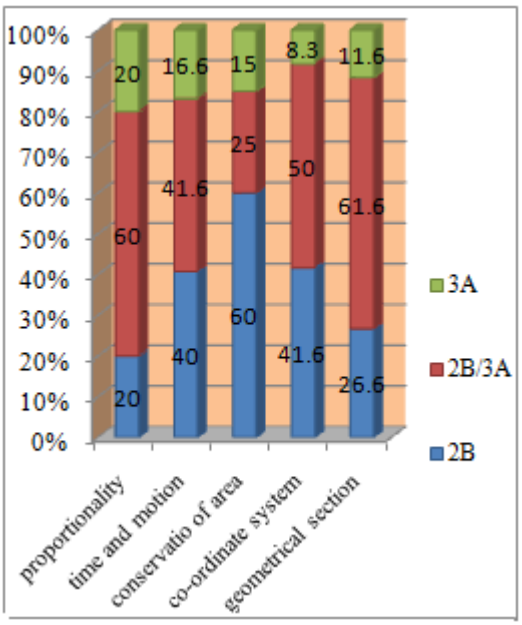


Figure 2.2: Distribution of respondents according to their belonging stages in government and private schools (part 2)

Seventy seven percentage (76.6) of government school students and 20 percentage of private school students have no logical proportional thinking so they comes under late concrete operational period, (16.6%) of government school and (60%) of private school students belongs to transition period as they have practical proportional thinking and 6.6% of government and 20% of private school have complete proportional thinking so they belongs to early formal operational stage.

In time and motion, 63.3% government school and 40% private school student have incorrect judgement so they belonging to late concrete operational period and 5% of government school and 16.6% of private school student have fully correct judgment so they belonging early formal operational stage

Sixty two percentage (63.3%) of government school and 60% of private school students have no conservation so; they come in late concrete operational period. 6% of government school and 15% private school students belongs to transition period as having partial conservation.

In co-ordinate system, 50% government school and 41.6% private school student have been failure to draw the figures so they belonging to late concrete operational period and 3.3% of government school and 8.3% of private school student have fully correct figures so they belonging early formal operational stage and46.6% of government school and 50% of private school student have partial correct figures so they belonging to transition period.

In geometrical section, 46.6% government school and 26.6% private school student have been failure to draw the figures so they belonging to late concrete operational period and 3.3% of government school and 11.6% of private school student have fully correct figures so they belonging early formal operational stage and50% of government school and 61.6% of private school student have partial correct figures so they belonging to transition period.

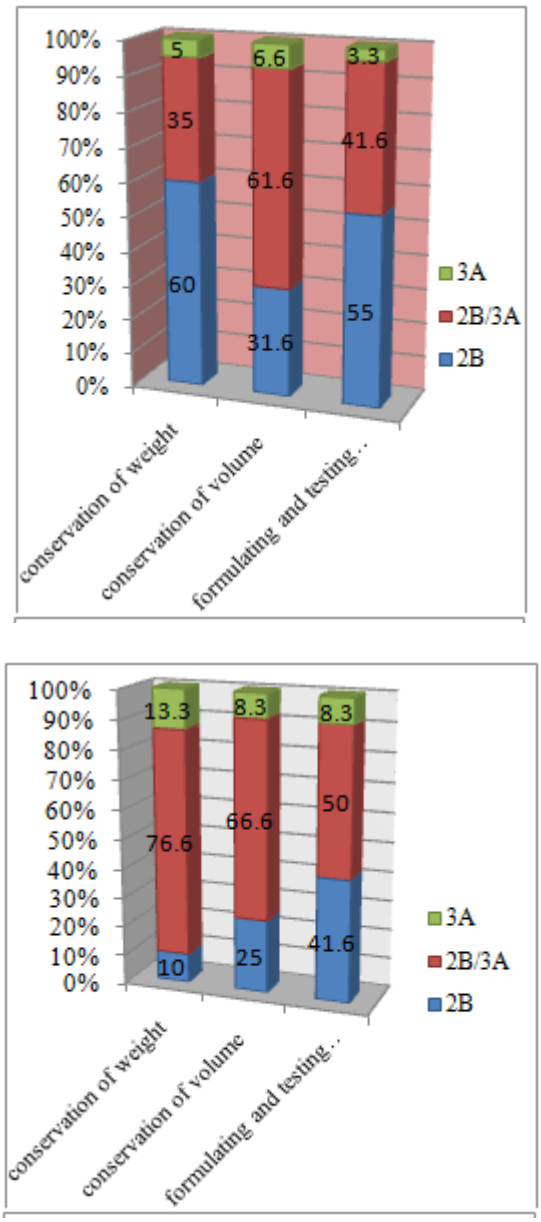


Figure 2.3: Distribution of respondents according to their belonging stages in government and private schools (part 3)

Thirty five percentage (35%) of government school and 76.6% of private school students have partial conservation of weight, 61.6% of government school and 66.6% of private school students have partial conservation of volume so; they come in transition period.

Sixty one percentage (60%) of government school and 10% of private school students have no conservation of weight and 31.6% of government school and 25% of private school students have no conservation of volume so; they come in late concrete operational period. Five percentage (5%) of government school and 13.3% private school have complete conservation of weight and 6.6% of government school and 8.3% private school students have complete conservation of volume so, they belongs to early formal operational stage.

55% of government school and 41.6% of private school students was failure to formulate and test the hypotheses whereas 41.6% of government school and 50% of private school students have only formulation and partial testing of hypotheses so belongs to transition period. And only 3.3% of government school and 8.3% of private school students was able to formulate and test the hypotheses so, they come under early formal operational stage.

5. Discussion

According to **Nir-Gal & Klein, 2004**; Teachers and the children in their classroom were placed in one of three groups: mediation, accompaniment, and no assistance/control group In the mediation group, teachers helped the children focus on the task, they expanded and encouraged children's thinking, and regulated children's behaviour. Teachers in the accompaniment group were instructed to only respond to children's questions. Teachers in the third group, no assistance/control provided only minimal technical assistance. Children were assessed in the beginning and the end of the school year on abstract reasoning, vocabulary, visuo-motor coordination, and planning behaviour. Results showed that children in the mediation group scored significantly higher than both groups on all measures. Furthermore, there were no significant differences. (6)

Another study of 212 preschool children found different results (**Primavera, Wiederlight, & DiGiacomo, 2001).** Eighty-nine children were assigned by classroom to a traditional access group, in which computers were placed in the classroom and used in the traditional way that teachers implement computers. The remaining 123 children were assigned to a mentor mediated group, in which the children participated in 15-30 minute weekly training sessions with a research assistant for the entire year. The content of the training included the names and functions of the computer components and how to navigate the software. School readiness was measured through a computer program designed to assess the child's skill level based on their performance, and adjust the difficulty level of the software accordingly.

The two groups were not significantly different in their performance on the program at pre test. Post test results indicated that 30% of the mentor mediated students performed at the mastery level, compared to only 1% of the traditional access group.(7)
According to **Liu & Bera 2005**, tools supporting cognitive processing tools play a more central role early in the problem-solving process whereas tools supporting cognitive activities that would be out of students' reach otherwise and tools supporting hypothesis generation and testing were used more in the later stages of problem-solving. The findings also indicated that the students increasingly used multiple tools in the later stages of the problem-solving process. The various tools, in performing different functions, appeared to enable students to coordinate multiple cognitive skills in a seamless way and, therefore, facilitated their information processing. (8)

6. Conclusion

Highly significant difference was found between private and government school students with corresponding value of class inclusion. As per cognitive capabilities in part 2 there

are five division for their assessment i.e. proportionality, time and motion, conservation of area, geometrical section and co-ordinate and out of which only three have a significant relationship i.e. conservation of area, proportionality and co-ordinate system between private and government school students. As per part 3 of cognitive assessment consist of three divisions for the assessment and out of which only three have a significant relationship i.e. conservation of volume, proportionality and formulating and testing of hypotheses between private and government school students. Majority of students of private school belongs to transition period and minimum to early formal operational stage while in government school maximum respondents belongs to late concrete operational stage and minimum to early formal operational stage.

7. Recommendations

1) Necessary changes in school infrastructure and academics must be introduced in government schools.
2) Government school teachers should be provided with orientation and refresher courses so that they can enhance creative abilities among students
3) A democratic, friendly, cooperative and encouraging climate should be provided as it will make the student to feel psycho-logical safety and freedom which will aid to their creative growth.
4) Government school should be provided with adequate infrastructure and equipments for teaching purpose.

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