Science Achievement among Elementary School Students with Respect to their Gender, Parental Occupation and Age

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Abstract

This research article aims to explore the levels of science achievement of elementary students and find the difference in science achievement of the students with respect to their gender, parental occupation and age. The study was conducted with 140 elementary level students from different schools in India with the help of Google forms. The normative survey method was used in this study. A standardized test (Mithlesh, K & Raghu, A) was administered to collect the data on their achievement in science. Results reflect that there is moderate level science achievement, no influence of parental occupation, significant influence of gender and age on science achievement of elementary students.

Keywords: Science Achievement, elementary school students, gender, parental occupation and age.

Introduction

Science is always evolving every experiment between human and nature. It is continuous process of knowing about our self and surrounding which directly or indirectly affects our knowledge. It helps us to understand the phenomenon occur around human body. Study of science at elementary level delivers a basic understanding of a human body and the natural environment, which is essential for all learners. The study of science at elementary level provides a basic understanding of the human body and the natural environment, which is essential for all learners (Dawar, 2012). The curriculum of science provides an understanding of science to individual needs, for example,

health, diet, drug awareness, fire hazard, and electrical safety, in addition, to provide opportunities for pupils to engage with social issues on a local, national or global scale. The National Policy on Education (1986) made the science as a compulsory discipline in school curriculum and it has recommended to develop the child well defined abilities of inquiry, objectivity, courage to question, problem solving, decision making, discovering relationship of science with different aspects of daily life through science education.

Elementary education is the largest single enterprise all over the world. A large number of teachers, the biggest number of pupils, a number of supervisors and administrators are involved in this programmed. As such, some from the point of view of magnitude, from the stand point of psychological preparedness, from the preponderance of sociological influences in view of the economic necessities, and the philosophical background and in view of scientific enlightenment and humanism, the role of elementary education is extremely significant and crucial. In formal system of education mostly cognitive development of the child is regarded as one of the major indicators of quality education. The evaluation/examination plays major role in the assessment of the learners' understanding level of the different subjects taught in the classroom by a teacher.

The NCF-2005 recommended on science curriculum and assessment at school stage that to make content, process and language of science teaching commensurate with learners' age-range and cognitive reach. Learner is engaged in acquiring methods and process that will nurture their curiosity and creativity, particularly in relation to the environment. Science teaching is placed in the wider contexts of children's environment to equip them with requisite knowledge and skills to enter the world of work.

Objectives of the study

1. To know the levels of achievement in science of elementary students
2. To study the influence of gender, parental occupation and age on science achievement of elementary students

Hypotheses of the study

1. There is no significance difference in student's Science Achievement with respect to gender at elementary level.
2. There is no significance difference in student's Science Achievement with respect to gender at elementary level

3. There is no significance difference in student's Science Achievement with respect to parental occupation at elementary level.
4. There is no significance difference in student's Science Achievement with respect to their age at elementary level.

Methodology

Normative survey research method was used in the present study. A sample of 140 elementary students (completed VIII class) from different schools in India was participated. Google form was used to collect the data. The sample consisted of 104 boys and 34 girls; 38 students with parents' occupation - government employees, 43 students with their parents' occupation private, 59 students with their parents 'occupation nether government nor private. The sample also included three different age categories of below & 13 years (sub sample=39), age between 14 & 15 (sub sample=94) and 16 years & above (sub sample=07). The sample selected for the study is shown in the Table-A.

Table-A: shows the sample of the study with selected variables and categories.

S. No	Variable	Categories	N	Total
1	Gender	Boys	106	140
		Girls	34	
2	Parents Occupation	Govt.	38	140
		Private	43	
		Others	59	
3	Age	Below & 13 years	39	140
		14 to 15 years	94	
		Above & 16 Years	07	

A standardized tool "Achievement Test in Science (Class-VIII)" developed by Mirthless, K & Raghu, A (2019) was used in this study. It consisted of 46 multiple choice items with three content areas of chemistry (15), physics (16) and biology (15). Each item carries one mark for correct response and zero mark for incorrect or un-attempt response. Reliability coefficient of the tool 0.91 was found by split half method, content validity was established for the tool.

Results and Discussion

1. **Level of Achievement**

The descriptive statistics- mean, SD of the science achievement of elementary level students are 21.41, 9.00 respectively. By the help of applications of normal probability curve, researchers categorized the total science achievement in to three levels as 1. Low achievers (lowest score to Mean-SD), 2. Moderate achievers (Mean-SD to Mean +SD) and 3. High achievers (Mean + SD to Maximum score). The result is presented in the table-1.

Table-1: Level of achievement among Science students

S.NO	Level of achievement	N	Valid Percent
1	Low Achievers	31	22.1
2	Moderate Achievers	87	62.1
3	High Achievers	22	15.7
	Total	**140**	**100.0**

Table-1 shows that there are 22% of low achievers, 62% of moderate achievers and only 15.7% of high achievers in science achievement at elementary level. It can be observed that the maximum students are moderate achievers in science. The results of the study are supported by the study of Nahar(2021), which reveals that average score for the district of Central/New Delhi was significantly higher than the average score of overall Delhi State. In Mizoram, average performance of students in science was significantly lower than the national average in Science subject (NCERT, 2015&Homi Bhabha Centre for Science Education, 2017).

The bar graph on level of science achievement and histogram for total scores on science achievement are shown in the figures. (figure-1a & figure-1b)

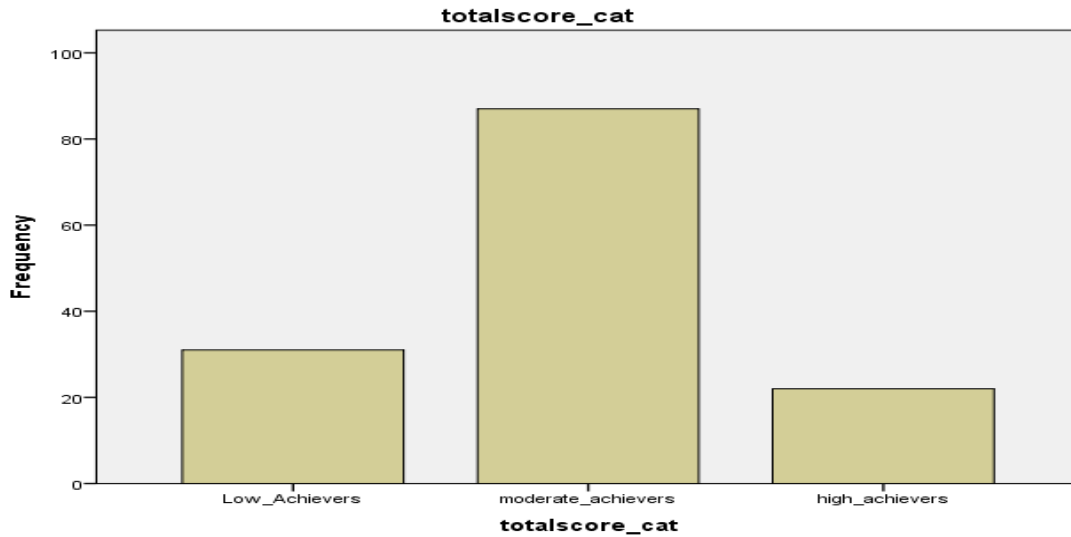Figure-1a: shows level of students' science achievement at elementary level
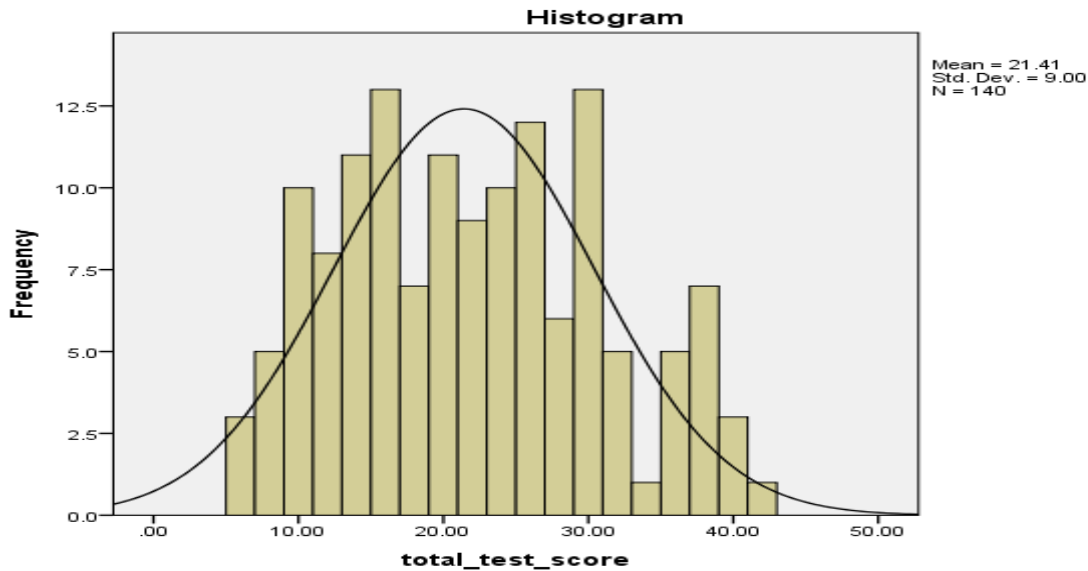
Figure-1b: shows histogram for total scores on science achievement at elementary level

2. Influence of Gender on Science achievement

To test the null hypothesis, t- test is employed on data. The result is shown in the table-2.

Null Hypothesis: There is no significance difference in student's Science Achievement with respect to gender at elementary level

Table-2: Shows mean SD and t-values on Science Achievement with respect to gender

S.No	Gender	N	Mean	SD	t-value	p-value
1	Boy	106	18.91	8.28	6.64**	0.000

| 2 | Girl | 34 | 29.20 | 6.36 | | |

** Significant @ 0.01 level.

Table-2 shows that the means of the boys and girls are 18.91 & 29.20 respectively; SDs are 8.28 & 6.36 respectively. The t-values 6.64 (p=0.000 ≤ 0.01) indicates significant at 0.01 level. Hence the null hypothesis is rejected. It can be concluded that there is a significant difference between boys' and girls' achievement in science at elementary level. It is observed from the same table-2 that the mean of the girls is greater than the mean of the boys. So, Girls achievement is higher than boys' achievement in science. Farooq, Chaudhry, Shafiq&Berhanu (2011), Gustavsen&Margareth (2017), Josip Burusic, Toni Babaroic& Maja Serie (2012), support the results of the present study. It is contradictory to the studies of Hamilton (2006). Gender differences were found in science achievement (Maccoby & Jacklin , 1974, Steinkamp & Maehr , 1983, Kotte, 1992, Young & Fraser , 1993). No difference in science achievement by gender (Hyde & Linn, 2006). Male and female students do not differ significantly on achievement in Science (Kaur *et al,* 2015).

3. Influence of Parents occupation on Science Achievement

One-way ANOVA was employed to compare science achievement scores with respect to parents' occupation. The result of ANOVA tables is shown in the table-3a & table-3b

Null Hypothesis: There is no significance difference in student's Science Achievement with respect to parental occupation at elementary level

Table-3a: Shows ANOVA -descriptive statistics of science achievement and parents' occupation

Parents Occupation	N	Mean	SD	Minimum	Maximum
Government	38	21.31	8.96	6.00	40.00
Private	43	22.62	8.91	6.00	38.00
Others	59	20.59	9.13	6.00	41.00
Total	**140**	**21.41**	**8.99**	**6.00**	**41.00**

Table-3b: shows ANOVA table for Science achievement and Parents occupation

Source	Sum of Squares	df	Mean Square	F	Sig.

Between Groups	103.477	2	51.739	0.635#	0.531
Within Groups	11154.494	137	81.420		
Total	**11257.971**	**139**			

not significant

The table-3areveals that the mean scores of students of parents' occupation having government, private and others are 21.31, 22.62 and 20.59 respectively; whereas the SD values are 8.96, 8.91 and 9.13 respectively for above categories of parents' occupation on Science achievement test. From the table-3b, F-value 0.635(p=0.531 > 0.05) indicates, which is not significant at 0.05 level. Hence the null hypothesis has not been rejected. It can be concluded that there is no significance difference in student's Science Achievement with respect to parental occupation at elementary level. Parental family background does not have significant effect on academic achievement of students (Ogunsola, Osuolale&Ojo, 2014).

4. Influence of age on Science Achievement

One-way ANOVA was employed to compare science achievement scores with respect to age. The result of ANOVA tables is shown in the table-4a,table-4b& table-4c.

Null Hypothesis: There is no significance difference in student's Science Achievement with respect to their age at elementary level

Table-4a: Shows ANOVA -descriptive statistics of science achievement and age

S.NO	Age categories	N	Mean	SD	Minimum	Maximum
1	Below & 13	39	26.95	8.87	10	42
2	Age 14 to 15	94	20.23	8.58	6	40
3	16 &Above	7	15.43	8.24	6	30
	Total	**140**	**21.86**	**9.21**	**6**	**42**

Table-4b: Shows ANOVA table for Science achievement and Age

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1547.959	2	773.979	10.342**	.000
Within Groups	10252.463	137	74.835		
Total	**11800.42**	**139**			

** Significant at 0.01 level

The table-4areveals that the mean scores of students of age categories- Below &13, age 14 to 15 and 16 & above are 26.95, 20.23 and 15.43 respectively; whereas the SD values are 8.87, 8.58, and 8.24 respectively for above age categories on Science achievement test. From the table-4b, F-value 10.342 (p=0.000≤ 0.01) indicates, which is significant at 0.01 level. Hence the null hypothesis is rejected. It can be concluded that there is a significance difference in student's Science Achievement with respect to their age.

Multiple comparisons were analyzed by the help of post hoc test (Tukey HSD test). The result of this further analysis is shown in the table-4c.

Table-4c: Shows the multiple comparisons of different age groups influencing on science achievement at elementary level.

S.NO	(I) Age	(J) Age	Mean Difference (I-J)	Sig.
1	Below & 13	Age 14 to 15	6.715^{*}	.000
		16 &Above	11.520^{*}	.004
2	Age 14 to 15	Below & 13	-6.715^{*}	.000
		16 &Above	4.805	.335
3	16 &Above	Below & 13	-11.520^{*}	.004
		Age 14 to 15	-4.805	.335

*Significant at 0.05 level

From the table-4c, it can be observed that there was a significant difference between students age with below & 13 and students age 14 to 15; students age with below & 13 and students age 16 & above; and there was no significant difference between students age 14 to 15 and students Age 16 & above. These results are supported by the studies of MarijaSakic, Josip Burusic and Toni Babarovic (2013).

Major findings of the study

1. The maximum students at elementary level are moderate achievers in science.
2. There is a significance difference in student's Science Achievement with respect to gender at elementary level.
3. There is no significance difference in student's Science Achievement with respect to parental occupation at elementary level.
4. There is a significance difference in student's Science Achievement with respect to their age at elementary level.

Conclusions and Recommendations

The quality of higher education is totally dependent on the criteria set in elementary stage of education. The present study deals with the science achievement of learners at elementary stage of education. The results from the study revealed the elementary level students have moderate level achievement in science. The science teachers should concentrate on different activities and provide flexible learning and they may create interest in science to make them high achievement in science. Research results show there is a difference in science achievement in relation to gender. Girls have better performance in science than boys. So, teachers may offer mixed gender group activities to enhance their learning. The learning styles of boys and girls may be taken in to consideration while teaching learning process taking place. Teachers should implement the strategies that would encourage boys to engage in science classes to remove the gap between boys and girls for participating in class room activities. Results of the study confirm that there is no influence of parents' occupation on science achievement among elementary students. Educational authorities may keep in mind this consideration for educational growth of the students. Age of the students influences on their learning performance in science ,it is suggested that the curriculum planners develop the content and pedagogy according to age levels. Science teachers should implement the learning strategies according to the age of the learners.

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