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Relationship between Science Process Skill and Scientific Literacy among Secondary School Students

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Abstract: *This study attempted to determine the relationship between science process skills and scientific literacy among secondary school students. The population of this study was composed of secondary school students in Kerala. Stratified random sampling adopted for the study. Total 300 secondary students selected as a sample for the study. The data analysis was done using test of significance for difference between means and Carl Pearson's product moment correlation. The study findings indicated that there is significant relationship between Science process skills and scientific literacy among secondary school students in Kerala. Science process skill promotes the rational thinking and it leads to the scientific literacy.*

Key Words: *Science Process skills, scientific literacy and secondary school students*

1. INTRODUCTION:

The science process skills include intellectual skills, associated psychomotor and affective skills that are concerned with the learning of science in all its aspects. A Process is a series of activities or operations performed to attain certain goals or products. Science Processes are the inter-linked activities performed by any qualified person during the exploration of the universe. The meaning of the "process of science" is expressed in many ways (Sheeba, 2013).Science process skills are the basis for scientific thinking and research (Mutlu and Temiz, 2013). Tobin and Capie (1982) define science process skills as identifying a problem, formulating a hypothesis about the problem, making valid predictions, identifying and defining of variables, designing an experiment to test the hypotheses, gathering and analyzing data and presenting rational findings that support the data. The term scientific literacy was first used in the late 1950s, its chief exponent being De Boer (2000). According to Arons (1983), a scientifically literate individual should be able to apply scientific knowledge n reasoning skills correctly to solve problems and make decisions for personal, civic and professional skills. Miller suggested three dimensions of scientific literacy. Dimension 1: Understanding key terms and concepts of science. Dimension 2: understanding the nature, norms and methods of science and scientific approach. Dimension 3: understanding the relationship of science, technology and society and the attitude, ethics and values related to science. It has been agreed globally that every individual should have basic knowledge and understanding of science. The minimum level of scientific understanding which is required to be achieved by all citizens, an obligation on the part of the state to provide it to all its citizens, is called scientific literacy. This is the reason that the government while framing the national policy of education, 1986 and the national curriculum framework for school education, 2000, has decided to make science as a core subject from class 1 to class 10 to promote scientific literacy, scientific temper and scientific attitude. Hence the study is entitles as relationship between science process skills and scientific literacy among secondary school students.

1.1. Hypothesis

- There is significant relationship between science process skills and scientific literacy among secondary school students.
- There is significant difference in the science process skills and scientific literacy among secondary school students based on gender.

1.2. Objectives

- To assess the science process skills among higher secondary school students.
- To test the scientific literacy among secondary school students.
- To find out whether there exist any relationship between science process skills and scientific literacy among secondary school students.
- To find out the relationship between science process skills and scientific literacy among secondary school students based on gender.

2. METHODOLOGY:

The current study possesses two variables such as science process skills and scientific literacy. Among these, science process skill is the independent variable and scientific literacy is the dependent variable. For this study, the investigator administered science process skill test and scientific literacy test for secondary school students. The reliability of science process skill test and scientific literacy test was 0.7 and 0.67 respectively. The population of this study was secondary school students in Kerala. The investigator adopted stratified random sampling and sample was 300 students from various districts of Kerala. Test of significance for difference between means and Carl Pearson's product moment correlation are used for the statistical analysis of the data.

3. RESULT:

Table 1.Test of significance for difference between means of Science process skills of boys and girls

Gender	Number	Mean	Standard deviation	C.R.	Level of significance
boys	144	15.21	4.87	0.15	Not significant
girls	156	15.29	5.24		

The calculated value of C.R. is 0.15 and is not significant at 0.05 level (C.R. = 0.15; p>0.05). Since the mean of the boys do not differ significantly from that of the girls, boys and girls are more or less equal in Science process skills.

3.1. Tenability of hypothesis:

Test of significance for difference between means of Science process skills of boys and girls revealed that there is no significant difference between boys and girls in Science process skills. Hence the null hypothesis formulated in this context is not rejected.

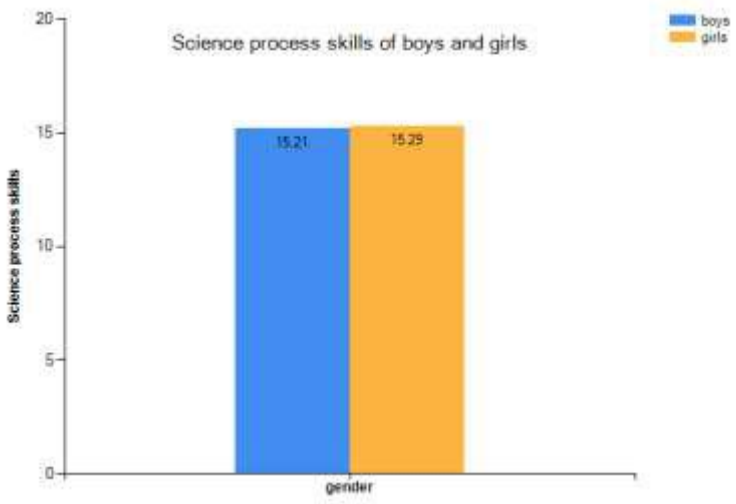

Figure 1. *Science process skills of boys and girls*

Table 2. Test of significance for difference between means of Scientific Literacy of girls and boys

Gender	Number	Mean	Standard deviation	C.R.	Level of significance
girls	156	15.44	5.6	0.54	Not significant
boys	144	15.11	5.11		

The calculated value of C.R. is 0.54 and is not significant at 0.05 level (C.R. = 0.54; p>0.05). Since the mean of the girls do not differ significantly from that of the boys, girls and boys are more or less equal in scientific literacy.

3.2. Tenability of hypothesis

Test of significance for difference between means of scientific literacy of girls and boys revealed that there is no significant difference between girls and boys in Scientific literacy. Hence the null hypothesis formulated in this context is not rejected.

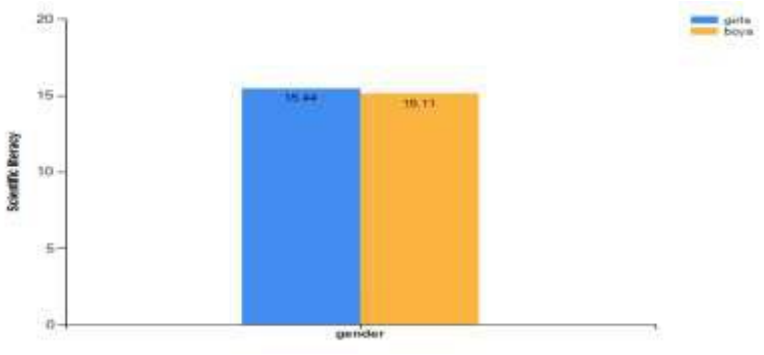

Figure 2. *Test of significance for difference between means of Scientific Literacy of girls and boys*

Table 3. Correlation between Scientific Literacy and Science process skills

N	Coefficient of correlation (r)	t	Level of significance	SEr	95% CI Lower	95% CI Upper	Shared variance
300	0.63	14.11	0.05	0.03	0.56	0.7	40.05

The calculated value of r = 0.63 and is significant at 0.05 level. (r = 0.63; p<0.05). Hence it can be concluded that there is significant positive relationship between scientific literacy and Science process skills. The value of shared variance is obtained as 40.05. This means that 40.05% of the variance in Science process skills can be explained by scientific literacy.

3.3. Tenability of hypothesis

The test of significance of relationship between scientific literacy and Science process skills revealed that there is significant relationship between scientific literacy and Science process skills. Hence the null hypothesis formulated in this context is rejected.

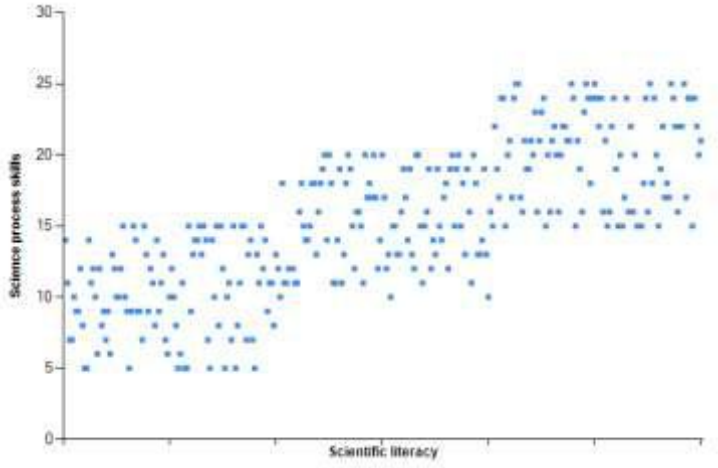

Figure 3. *Correlation between Scientific Literacy and Science process skills*

4. DISCUSSION AND CONCLUSION

Science teachers should develop in themselves and their students such qualities that make an individual a scientifically literate person. According to Arons (1983) and Hodson (1988), the following qualities must be developed in a scientifically literate person such as interest towards science, nature and natural recourses and their utility for mankind, an inclination and appreciation towards technology and its use in day-to-day life, knowledge and understanding of the relationship between science, technology and society, a general understanding and application of the common concepts, principles, laws and process of science, basic skills of science and technology, the ability to assimilate and use technical information, rational thinking, reason based decision and unbiased attitude and interest in using the findings of science and technology in improving the quality of one's life, family, community and nation.

The present study focuses on the relationship between science process skills and scientific literacy among secondary school students. The investigator found that there is no significant difference between boys and girls in

Science process skills and scientific literacy. But there is significant relationship between Science process skills and scientific literacy among secondary school students in Kerala. Science process skill promotes the rational thinking and it leads to increasing of scientific literacy.

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