Scholarly Research Journal for Interdisciplinary Studies
Online ISSN 2278-8808, SJIF 2021 = 7.380,
http://www.srjis.com/issues_data?issueId=213
PEER REVIEWED & REFEREED JOURNAL, MAY-JUNE 2023, VOL- 11/77
https://doi.org/10.5281/zenodo.8182276

STUDY OF ASSESSING SCIENTIFIC LITERACY ON THE CRITERIA OF PISA FRAMEWORK AMONG 9TH CLASS STUDENTS IN AMRITSAR DISTRICT OF PUNJAB.

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Paper Received On: 21 JUNE 2023

Peer Reviewed On: 30 JUNE 2023

Published On: 01 JULY 2023

Abstract

In the last few years, knowledge about the world of science and technology has increased. This requires updating and restructuring science education. Scientific literacy is knowing basic concepts and understanding scientific processes. It involves the application of science to cultural, political, social and economic issues. PISA has focused on science as a core domain and defines scientific literacy as "the ability to engage with science-related questions and scientific ideas as a reflexive citizen. A scientifically literate person is prepared to engage in reasoned debate about science and technology. It requires the ability to scientifically explain phenomena, evaluate and plan research, and scientifically interpret data and evidence. India has participated in the PISA test only once before, in 2009. In this round of PISA, where students from Himachal Pradesh and Tamil Nadu took the test, India was ranked 72 out of 73 countries, behind only Kyrgyzstan. Since then, India has stayed away from the Test until now. The Global Education Development Agenda, reflected in Goal 4 (SDG4) of the Sustainable Development Strategy 2030 adopted by India in 2015, aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities by 2030". PISA provides a comparable and robust measure of progress so that all countries, regardless of their starting point, can see where they are towards the internationally agreed goals of quality and equity in education. By participating in PISA, countries can develop their capacity to develop relevant information. Therefore, the researcher tried to study the scientific literacy of 9th-grade students using the criteria of the PISA framework. The study found that firstly, there was no significant difference between the mean scores of scientific literacy among girl and boy students. Secondly, the private school students performed better than government school students in all three dimensions of scientific literacy but the performance decreases with the level of difficulty increases in both types of schools.

Keywords: *PISA, Science, Scientific literacy, Scientific competencies.*

INTRODUCTION:

The remarkable development of science and technology in the 20th century revolutionized modern society. These developments have created opportunities and challenges in many disciplines, including engineering, agriculture, medicine, information technology, research, health and nutrition. These developments have dramatically changed the way we live, facilitating access to resources and information and leading to global connectivity. They have changed beliefs, principles and values that affect all aspects of society. Every person in today's world should know some basic scientific concepts or facts to understand what is happening around them. The purpose of learning science should be to inspire people to have a reasonable attitude towards science. It can help create a passionate approach to accurate observations of the things, people and phenomena being studied. It is important to instil in students a moral and ethical perspective on research and the application of technology. The National Curriculum Framework (NCF, 2005) states that science is a dynamic, ever-expanding body of knowledge that encompasses a wide range of subjects. Science can play a liberating role in a culture that is forward-looking and seeks to break the cycle of ignorance, poverty and superstition. Humanity is now more dependent on scientific knowledge than ever before. Therefore, it is necessary that research activities be carried out by professionally trained specialists and that the public understand and support the development of science. Scientific education should be given from the beginning so that citizens are born with a sufficient foundation in science and are dedicated to it. NEP-2020 affirms that education is paramount for the realization of human potential, the development of a fair and just society and the promotion of national development. Providing universal access to quality education is key to ensuring India's continued rise and leadership on the global stage in terms of economic growth, social justice and equality, scientific progress, national integration and cultural preservation. Universal quality education is the best way to develop and maximize the rich talents and resources of our country for the benefit of the individual, society, country and the world. In the next decade, India will have the largest youth population in the world and our ability to provide quality educational opportunities will determine the future of our country. The Global Education Development Agenda, reflected in the Sustainable Development Agenda 2030 Goal 4 (SDG4) adopted by India in 2015, aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities by 2030". UN countries approved the Sustainable Development Goals

(SDG) in September. The year 2030. PISA, which already provides measurement tools for this purpose, is committed to improving, expanding and enriching its assessment tools. PISA assesses the performance of 15-year-old students in science, reading and mathematics in more than 70 high- and middle-income countries. PISA provides a comparable and robust measure of progress so that all countries, regardless of their starting point, can see where they are towards the internationally agreed goals of quality and equity in education. By participating in PISA, countries can also develop their capacity to develop relevant information. Although most PISA countries already have adequate systems in place, this is not the case in many poor countries. To this end, the OECD Development PISA initiative not only aims to broaden the scope of international assessment to include more middle- and low-income countries but also helps those countries build their own national assessment and data systems. PISA is also expanding its assessment domains to include other skills relevant to Goal 4. PISA stands for "Program for International Student Assessment" and is organized by the OECD together with other participating countries. The first survey was conducted in 2000 and every three years thereafter. PISA measures the knowledge and skills of 15-year-olds, the age at which students in most countries approach the end of compulsory schooling. The focus is on areas important to life after school, including science. PISA is a statistically rigorous program that assesses student performance and gathers information about student, family, and institutional factors that can help explain differences in performance around the world. Considerable effort was made to achieve cultural and linguistic breadth and balance in the assessment material. Strict quality assurance mechanisms are applied to translation, sampling and data collection to ensure that the results are as meaningful as possible. The aim is to significantly improve the understanding of educational outcomes in both OECD countries and the growing number of countries in earlier stages of economic development that choose to participate. The purpose of the test is not to rank the countries voluntarily participating in the evaluation, but to provide a comprehensive analysis of how educational systems work in preparing students for higher education and subsequent work. After collecting results from various parts of the world, experts translate those results into data points that are evaluated based on country scores. When a country scores well, it indicates that it not only has an effective education system but also an inclusive education system, where students from both advantaged and disadvantaged backgrounds do equally well. In addition, the test assesses whether the education system in these countries teaches students enough social and community skills to enable them to succeed in all aspects as members of the workforce. The OECD also hopes that the test will enable

countries to learn from each other about effective education policies and improve their systems through other examples. India has participated in the PISA test only once before, in 2009. In this round of PISA, where students from Himachal Pradesh and Tamil Nadu took the test, India was ranked 72 out of 73 countries, behind only Kyrgyzstan. Since then, India was initially out of the Test. Now the government. The Indian decided to conduct the PISA 2022 test again and this time students from Chandigarh had to sit for the exam. About 1.75 lakh students from government schools in Chandigarh and 600 from Navodaya Vidyalaya and 3,000 from Kendra Vidyalaya were scheduled to take the three-hour PISA test in 2022, but after the exams were affected by COVID-19, the Indian government decided to cancel their participation.

SCIENTIFIC LITERACY:

Science literacy is developed through comprehensive and applied science education. Thus, in that context, the concept of scientific literacy refers to knowledge about both science and science-based technology. However, science and technology differ in terms of uses, processes and products. Technology seeks an optimal solution to a human problem, and there may be more than one optimal solution. In contrast, science seeks an answer to a specific question in the material world of nature. Scientific literacy requires, in addition to knowledge of scientific concepts and theories, knowledge of general procedures and practices related to scientific research and knowledge of how these enable the advancement of science. Therefore, scientifically literate people understand the basic concepts and ideas that form the basis of scientific and technological thinking; how such information was obtained; and the extent to which such knowledge is justified by evidence or theoretical explanations.

METHOD OF STUDY

This study belongs to the category of 'descriptive research' with composite characteristics of inter-group comparison. Since the primary objective lies in assessing the scientific literacy of 9th-class students concerning their gender, school type and locality the present investigation applied the causal-comparative status survey design.

Population

The entire group from which the sample is drawn is known as the population. A population is a well-defined group of individuals or observations. The population in the present study was defined as the government school students and Private school students in different schools of Amritsar district in urban areas and rural areas, and from these schools, five were selected by lottery method. The PISA test is made to assess the scientific literacy of 15-year-olds. Hence the class 9th students were considered as a population for the present study.

Sample distribution

A sample comprised of 200 students which are selected from 5 schools (2 government schools and 3 private schools) of Amritsar district was taken for the study. Firstly, the list of Government and private schools in rural and urban areas was prepared by the investigator. After that with the help of the lottery method, two government and three private schools were selected randomly. Then, from each school students of the 9th class were selected.

Objectives of the study

The present study assesses scientific literacy among 9th-class students.

The following are the objectives of the study.

1. To study the scientific literacy of class 9th students.
2. To find out the influence of gender on science literacy of class 9th students.
3. To find out the influence of school type on science literacy of class 9th students.
4. To find out the influence of locality on the science literacy of class 9th students.

Hypotheses of the study

To achieve the above objectives of the study following hypotheses were formulated and tested. These hypotheses are framed by using all the variables in the present study.

H01: There exists no significant difference in the total mean scores of Scientific literacies between boys and girls.

H02: There exists no significant difference in the total mean scores of Scientific literacies between government and private school students.

H03: There exists no significant difference in the total mean scores of Scientific literacies between rural and urban school students.

INTERPRETATION

To test the significance of the difference between different demographic variables on the total scores of scientific literacies, a t-test has been carried out and the results have been presented below in the table:

Variable	Type of variable	N	Mean	Std. Deviation	T- value
Gender	Boys	100	5.69	3.581	1.167
	Girls	100	6.29	3.691	

School Type	Government School	105	2.89	1.423	28.877
	Private School	95	9.42	1.772	
Locality	Rural	92	6.82	3.736	3.019
	Urban	108	5.29	3.418	

The table reveals that the computed t-ratio for scientific literacy is 1.167 which is not significant. The above result indicated that the mean scores of girls in scientific literacy," is 6.29 and boys is 5.69 and the SD of girls in scientific literacy is 3.691 and boys is 3.581. The calculated t-value of 1.167 is not significant at 0.05 and 0.01 levels. This indicates that there is no significant difference between boys and girls in the scores of scientific literacy.

The table reveals that the computed t-ratio for the difference between government and private on the scores scientific literacy is 28.877 which is significant at the 0.001 level of significance. The above result indicated that the mean score of scientific literacy for government school students is 2.89 and for private school students is 9.42 and the SD of scientific literacy for government school students is 1.423 and for private school students is 1.772. The calculated t-value is 28.877 significant at 0.001 level (t=28.877). This indicates that there exists a significant difference in the mean scores of government school students and private school students on the scores of scientific literacy. The analysis of means indicates that private school students are better than government school students on the scores of scientific literacy.

The table reveals that the computed t-ratio for the difference between rural and urban school students on the scores of scientific literacies is 3.019 which is significant at the 0.001 level of significance. The above result indicated that the mean score of scientific literacy for rural area students is 6.82 and for urban school students is 5.29 and the SD of scientific literacy for rural school students is 3.736 and for urban school students is 3.418. The calculated t-value is 3.019 significant at 0.001 level (t=3.019). This indicates that there exists a significant difference in the mean scores of rural school students and urban school students on the scores of scientific literacy.

MAJOR FINDINGS

1. It was concluded from the mean scores that students belonging to different genders were not different in scientific literacy.
2. An examination of the means of the two groups shows that private school students have better scientific literacy than government school students. It was concluded that private school students have better scientific literacy than government school students.
3. An examination of the means of the two groups shows that rural area students are better at interpreting data and evidence scientifically than urban school students. It was concluded that rural school students are better at interpreting data and evidence scientifically than urban school students.

EDUCATIONAL IMPLICATIONS OF THE STUDY

Upgrade low-performing schools through Innovative Models:

This study showed that students in some schools were more successful and performed much better than others. A student from a private school received more points than a student from a government school, regardless of the location of the school. Based on this observation, an innovative model of Leadership School can be developed where less successful schools should be merged with leadership schools identified based on teaching and learning parameters. The mission of these leading schools is to identify problems and propose collaborative solutions, provide training and, if necessary, improve the skills of teachers and students in other schools operating in this framework.

Reform the School Examination System

Student learning outcomes must be regularly monitored using independent assessments. Reforms to the National Assessment Survey (NAS) by the National Council of Educational Research and Training (NCERT) are needed to implement standardized assessments of student learning to track the progress of each child and should ensure that testing is done throughout the education system.

Introduce English as a Medium of Instruction in all Schools:

In today's globalized world, English has become one of the most sought-after languages and has become a prerequisite for any professional job. The state government of Punjab may reconsider Punjabi as a medium of instruction in government schools together.

Develop scientific attitude and aptitude among students:

One of the main objectives of educational policies and programs in India must be to encourage a positive scientific attitude towards science in students. If a child develops a positive attitude

towards science, learning is a positive encounter. The main goal of science teaching and education should be the development of students' scientific skills. The scientific aptitude of students should be recognized and students with this quality should be actively supported to develop an interest in scientific knowledge and research so that they can fulfil their potential and progress to successful research careers. Scientific aptitude is known to be innate and maintained by the child's environment. It is important to create a stimulating environment where students are supported in the acquisition of knowledge and have the necessary tools to acquire it so that their scientific ability improves.

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Cite Your Article as:

Dr.Amit Kauts, & Ms. Tejswani Sharma. (2023). STUDY OF ASSESSING SCIENTIFIC LITERACY ON THE CRITERIA OF PISA FRAMEWORK AMONG 9TH CLASS STUDENTS IN AMRITSAR DISTRICT OF PUNJAB. Scholarly Research Journal for Interdisciplinary Studies, 11(77), 304–312. https://doi.org/10.5281/zenodo.8182276