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Gender Based Study: Science Processing Skills of Eight Grade Students in Government and Private Schools of Muzaffarabad

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Abstract

The current research aims to examine 8th-grade students' science processing skills in Muzaffarabad's Government and Private schools. The nature of the study was quantitative. A random sampling strategy was used to select 20 schools (10 private and 10 Government). There were 140 students in the sample, 70 of whom were male and the remaining 70 were female. From 70 male students, 35 students were drawn from five Government schools, with seven students from each school, and the same process was used for selecting the female students from five private schools. An achievement test containing questions of basic Science Process Skills was used as a research instrument. As a research instrument, an achievement test was used. So, for developing an achievement test science book of class 8th was studied by researcher, and many websites too. After these activities, an achievement test initial draft was developed by the researcher with the help of a respected supervisor. An achievement test comprised of six fundamental Science Process Skills. Observing, Classifying, Measuring, Communicating, Inferring, Predicting. For comparing the achievement test results, the Independent Sample t-test was used. When comparing more than two groups in this study, one ANOVA was used. Results of this research showed that the female students were better on science process skills compared to male science students. And the levels of private schools' performances were higher than the performances of the Government schools with respect to science processing skills.

***Keywords*:** Gender, Science Processing Skills, Government, Private

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Introduction

Science process abilities manifest themselves in our brains immediately and spontaneously. We can utilize the science method to address our inquiries concerning how the world functions by rationally separating the means in our reasoning. The science process skills are useful in science as well as helpful in every situation where decisive reasoning is required.

Any nation's degree of development depends mostly by its individuals' availability of highquality science education, and the extent of scientific knowledge acquired by the people there.Among the most im portant outcomes or objectives of science education are the development of a scientific mindset, a favorable attitude toward science, and science p rocess skills (Haleem, Javaid, Qadri, & Suman,2022).

Science processing skills include students' mental and physical activities related to gathering, organizing, and utilizing data to solve problems, make predictions, explain phenomena, comprehend scientific endeavors, and learn science. In order to effectively teach and learn, students had to acquire and apply these skills. The science processing skills that are commonly identified and described include observation, measurement, classification, communication, prediction, inference, use of numbers, the space/time relationship, questioning, variable identification and control, hypotheses, operational definition, experiment design, data interpretation, and modeling (Gizaw & Sota., 2023).

These skills are essential for children because they will help them learn science with comprehension, improve their academic performance and attitudes toward science, explore and examine the natural world, and develop their mental and intellectual processes (Gizaw et al., 2023). The Science Process Skills (SPS) are an important apparatus to deliver and utilize logical data, to perform logical analysis, and to tackle issues. These abilities can be acquired by students through specific science training exercises. For instance, the reason for learning by utilizing an exploration study is to assist in showing the logical cycles. The students undertaking a logical exploration study can get familiar with the cycles of science (Huppert et al., 2002).

Science process skills incorporate noticing characteristics, estimating amounts, arranging/characterizing, inducing, anticipating, testing, and conveying. In view of the twisting movement under the kindergarten to 12th Curriculum, learners who enter the middle school, especially grades 7th and 8th, have almost dominated, if not dominated, the fundamental process skills

in science. These skills are necessary for them to execute the exercises needed and progressively advance the capabilities alongwith the content.

Since school students are naturally curious, the subject of science is a perfect match. They are able to go on an exploration of the world and kids are encouraged to hunt for new findings. Therefore, science is an active subject filled with various exercises such as counting science and hands-on labs. Thus, science is perfect for fast, young children. Science is a strand that every kid must use in the formation kit. On the one hand, most individuals believe that Science in education is a necessity among things to complete, but on the other hand, they brand into with the aim of being prepared for entering the real world (Das, Namrata., Singh, Anand & Amrita,.2014).

Objective of the Study

Following was the major objective of underlying study:
To compare the students of Government schools and Private Schools district Muzaffarabad on Science process skills.

Review of Literature

The Basic Science Process Skills

The comprehension of science process normally alludes to abilities or capacities that should be possessed by the researchers on the course of logical revelation. These abilities are isolated into two gatherings: essential and coordinated interaction abilities. The essential interaction abilities incorporate noticing, posing inquiries, characterizing, estimating, and anticipating (Karamustafaoglu, 2011).

Incorporated Process Skills incorporate, distinguishing and characterizing factors, deciphering information, controlling materials, recording information, defining theories, planning examinations, making derivations and generalizations (Karamustafaoglu, 2011).

Observing

It is making use of the senses to learn about an object or any event. For example, describing a yellow pencil. Observation is the most fundamental skill in science. Observations are made with the help of the five senses. Good observations are crucial when learning the other science process skills (Kurniawati, 2021).

Classifying

Classifying things or events according to their attributes or standards.

For instance, putting all rocks of a certain hardness or grain size together. After making observations, it's critical to record parallels and divergences and to organize items according to their intended use. Requests must be made in order to help estimate the number of objects, events, and living beings on Earth (Özgelen, 2012).

Communicating

It involves describing an action, item, or event with words or visual representations. For instance, using a chart to illustrate how a plant's level has changed over time. Being able to share our experiences is essential. This can be accomplished through spoken word, maps, graphs, and diagrams (Ergül et al., 2011).

Measuring

Standard and nonstandard estimates or measures are used to describe an object's or event's dimensions. Example: measuring a table's length in centimeters with a meter stick. Measuring is essential for data collection, comparison, and interpretation. It helps us communicate. The metric system should be used to better understand the scientific world (Darmaji et al., 2019).

Inferring

It is also about making an intelligent guess on the basis of previous experiences or data of a person or scientist regarding any object, situation of event. Example: claiming that the pencil user made a lot of errors because the eraser was worn out. A deduction is a clarification considering a perception. It's a connection between what we see and what we already know (AbdRauf, Rasul, Mans, Othman & Lynd, 2013).

Predicting

It expresses the result of a future occasion in light of an example of proof. Example: predicting a plant's height in fourteen days on graph to show its gradual growth over the past four weeks. Prediction is the formulation of an anticipated outcome on the basis of previous experience. The reliability of a prediction is influenced by the nature of the event being predicted and the accuracy of previous observations. Prediction is founded on inference (Darmaji et al., 2019).

The objective of teaching science is to foster learners' abilities and empower people, and to apply those abilities in their regular day to day existences. These abilities influence the individual, social, and worldwide

existence of people. Science Process Skills are important device to create logical data, to perform logical examination, and to tackle issues (Panoy, 2013).

Riovero argues that general science covers more than only logical knowledge (Coronado, 2016). The science process skills should be employed as a standard when organizing instances rather than being presented as an independent, complete process. These skills ought to be connected to key concepts. Science material therefore provides a basis for illustrations, but it should not adopt the basic example. When all else is equal, exercises that improve understanding of science concepts and strengthen science process skills should be given more weight. This suggests that process skills support students' purposeful thinking by providing them with logical information and logical viewpoints (Coronado, 2016).

Logical information incorporates hypotheses, standards, and laws framing the content piece of sciences. Approaches to information obtaining are ways of getting logical information. From this, one of the approach to information procurement is science process abilities. The science process skills are the essential abilities of working with acquiring in science, permitting learners to be dynamic, fostering an awareness of certain expectations, expanding the continuity of learning, and giving exploration strategies (Turiman, et al.,2012).

Science Process Skills as a Building Block for Developing new Skills

The new public scientific educational programs and the way they are presented in course readings should consider the science process skills as the foundational blocks from which relevant science endeavors may be produced. For the development of science processing skills, science content should be taught in science schoolroom (Nyakiti et al., 2010).

According to Opulence's (2011) research, science education's objective is to teach learners to think like researchers, and it would be typical for them to emphasize the development of the mindset that outstanding researchers are able of display. He assessed the following skills on his review: measuring, classifying, comparing and problem-solving. This proved the null hypothesis, according to which the mean increases in scores of the trial and control groups differed significantly in their capacity to observe, estimate, and think critically. So, it can be said that science is still a subject that needs a few approaches to keep up with the constantly changing learning environment of students.

The core of request-based learning is structured by science interaction skills. Understanding how to do science means mastering the science process skills in a better way and employing them in a analytical analysis. Teachers who possess sufficient Science Process Skills can

develop the basic skills and teach the concepts effectively, and as a result their students can achieve success (Miles, 2010).

Attitude of an individual is concerned with a single perspective, acting, and conducting (Hebrio, 2013). It has a significant impact on the student, the instructor, the student's immediate social circle, and the educational system as a whole. They are contacts of some sort that shape attitudes. They can also be promoted just by imitating or evaluating a friend, parent, or instructor. The teaching and learning environment is also impacted by this impersonation or mimicking. In this way, the understudy uses the attitudes of his teachers to mold his own, which could potentially affect his learning outcomes.

Bloom's Taxonomy vs Science Process Skills

Levels of Bloom's Revised Taxonomy can assist students in progressing from the most basic memory and comprehension to more complex assessment and creation; it can be useful for revealing plans (Forehand, 2010).

Bloom's taxonomy is a characterization of learning targets initially created for general instructional purposes. The scientific categorization was accordingly modified to extend past intellectual cycles and to incorporate an extra information aspect. Psychometric estimates showing anomalies in the initial scientific classification prompted the correction, and the revised scientific classification has been modified for application in other fields (Lo et al., 2016).

The correction was provoked by psychometric estimations demonstrating irregularities in the first scientific categorization, and the reconsidered scientific classification has been adjusted for use in many disciplines (Lo et al., 2016).

Research Methodology

This study was quantitative in nature. It compared the science process skills of the students of 8th grade in Government schools and private schools of District Muzaffarabad, AJ &K.

Population

All the students of 8thgrade, both in Government and private sector schools of District Muzaffarabad AJ &K constituted the population from which samples were drawn for this comparative study.

Sample

A total of 140 eighth-grade students from 10 Government schools

and 10 private schools in the district of Muzaffarabad AJ &K, were chosen as a sample for this study using the simple random sampling technique. Of the 140 students, 70 attended Government schools and the remaining 70 attended private ones. Of the seventy students from Government schools, thirty-five were male and thirty-five were female. Private schools also adhered to the same policy. This strategy was used for the comparison of the performance of male and female students on science process skills to account for the equal numbers of males and females from Government and private schools. Twenty schools from the Muzaffarabad area were chosen with availability in mind.

Table 1

Sampling Frame

	Total	Government Schools		Private	Schools
		Govt. Boys Schools	Govt. Girls Schools	Private schools (Male)	Private schools (Female)
Schools	20	5	5	5	5
Students	140	35	35	35	35

Research Instrument

As a research instrument, an achievement test was used. So, for developing an achievement test science book of classes 7thand 8thwas studied by a researcher, and many websites too. After these activities, an achievement test initial draft was developed by the researcher with the help of a respected supervisor. An achievement test comprised of six fundamental Science Process Skills.

1. Observation
2. Communication
3. Classification
4. Measurement
5. Making Inferences
6. Predicting.

Validity

To check the validity of an achievement test, it was sent to two science specialists who validated the test. They gave suggestions to improve the achievement test. The researcher incorporated the suggested changes in the direction of the Science Specialists and the respected supervisor.

Pilot Testing

For pilot testing, twenty (20) students were selected randomly from two randomly selected Government schools and randomly selected two private schools. Five (5) students from each school, and then they were asked to take an achievement test. This same test was taken 3 times with the same students. The results were interesting, and significant differences were there in these tests. After this, the results were shared with the Supervisor, who observed it keenly and finally approved the achievement tool.

Results

For comparing the achievement test results, the Independent Samples t-test was used. When comparing more than two groups in this study, one ANOVA was used. Tables were created, and the results were explained.

Table 2

Comparison of Male Students of Govt. School and Private schools on Science Process Skills

		Learners Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% C.I of Diff. Lower	Upper
Male Govt versus Male Private	Equal variances assumed	6.442	.01	-2.11	68	.04	-3.06	1.45	-5.95	-.16
	Equal variances not assumed			-2.11	50.42	.04	-3.06	1.45	-5.97	-.14

(P=.01 < .05)

Table 2. shows that as p-value is less than 0.05. This value shows that the male students of government and private schools were showing difference on science process skills.

Table 3

Comparison of Male students of Government Schools and Private schools through descriptive statistics

	n	Mean	SD	Std. Error Mean
Male Govt versus Male Private	35	38.49	7.65	1.29
	35	41.54	3.88	.657

The scores value of the male students from the Govt. schools is 38.49, while on the other hand, male students from the private schools scores value is 41.54. It shows that the male students studying in private school perform higher than the Govt. school.

Table 4

Comparison of Female Students of Government Schools and Private Schools on Science Process Skills

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Std. Error Diff.	95% C.I Diff. Lower	Upper
Female Govt versus Female Private	Equal variances assumed	1.78	.19	-2.28	68	.025	1.05	-4.49	-.30
	Equal variances not assumed			-2.28	65.44	.026	1.05	-4.49	-.30

(P=.19 > .05)

Table 4 shows that there is no significant difference between the scores of females of the government school and the females of the private schools in science process skills.

Table 5

Comparison of Female Students of Government Schools and Private Schools on Science Process Skills

	n	Mean	SD	Std. Error Mean
Female Govt versus Female Private	35	41.43	4.81	.81
	35	43.82	3.94	.67

The scores value of the female students from the Government schools is 41.43, while on the other hand female students from the private schools

scores value is 43.83.The result indicates that the females from private schools are slightly higher than that from Government schools.

Table 6

Comparison of Female Students of Government Schools and male student of Government Schools Science Process Skills

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% C.I of Diff. Lower	Upper
Male Government and female Government	Equal variances assumed	2.69	.11	-1.93	68	.06	-2.94	1.53	-5.99	.106
	Equal variances not assumed			-1.93	57.24	.06	-2.94	1.53	-6.00	.12

Here P=.105 > .05, which means there is no any significant difference between the score of Male of the government school and the female of the government schools in science process skills.

Table 7

Comparison of Female Students of Government Schools and male student of Government Schools Science Process Skills

		n	Mean	SD	Std. Error Mean
Male Government Government	female	35	38.49	7.65	1.29
		35	41.43	4.81	.81

The scores value of the male students from the Government schools is 38.49, while the scores value of the female students from the Government is 41.43.

The results of the above table show that females from private schools is better than the males in Government schools. Hence the results showed that overall female students' performance is better than the male students.

Table 8

Comparison of Female and Male student of Private Schools on Science Process Skills

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% C.I of Diff. Lower	Upper
Male private and female private	Equal variances assumed	.00	.98	-2.45	68	.017	-2.29	.93	-4.15	-.42
	Equal variances not assumed			-2.45	67.98	.017	-2.29	.93	-4.15	-.42

Here P=.98 > .05, shows that there is no any significant difference between the scores of males of the private school and the females of the private school in science process skills.

Table 9

Comparison of Female and Male student of Private Schools on Science Process Skills

	n	Mean	Std. Deviation	Std. Error Mean
Male private	35	41.54	3.88	.66
female private	35	43.83	3.93	.67

The scores value of the male students from the private schools is 41.54, and the scores value of the female students is 43.83. This shows that private schools' results are slightly higher. On the other hand, female progress is better than boys.

Table 10

Comparison of Female Students of Private Schools and Male student of Government Schools on Science Process Skills

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% C.I of Diff. Lower	Upper
Male govt and female private	Equal variances assumed	6.40	.01	-3.67	68	.00	-5.34	1.45	-8.25	-2.44
	Equal variances not assumed			-3.67	50.82	.00	-5.34	1.45	-8.26	-2.42

Here P=.01 < .05, shows a significant difference between the scores of boys of the government school and the girls of the private schools in science process skills.

Table 11

Comparison of Female Students of Private Schools and Male student of Government Schools on Science Process Skills

	n	Mean	SD	Std. Error Mean
Male Govt &	35	38.48	7.65	1.29
Female private	35	43.83	33.94	.67

The scores value of the male students from the Government schools is 38.48, and the scores value of the female students in private schools is 43.83. This shows that private schools' results are outstanding.

Table 12

Comparison of Female Students of Govt. Schools and Male student of Private Schools on Science Process Skills

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Difference	95% C.I of Diff. Lower	Interval Upper
Female Govt. and Male Private	Equal variances assumed	1.80	.18	-.11	68	.91	-.11	1.04	-2.20	1.97
	Equal variances not assumed			-.11	65.10	.91	-.11	1.04	-2.20	1.97

Here P=.184 > .05, which shows that there is no any significant difference between the scores of males of the private school and the females of the government schools in science process skills.

Table 13

Comparison of Female Students of Govt. Schools and Male student of Private Schools on Science Process Skills

	n	Mean	SD	Std. Error Mean.
Female Govt. and	35	41.43	4.81	.81
Male Private	35	41.54	3.88	.66

The score value of the female from Government schools is 41.43. While the value from the male private is 41.54. This shows that there are not too many differences between these results. Only in some points, males from private schools are slightly better than females from Government schools.

Table 14

Comparison of All Students of Govt. Schools and All student of Private Schools on Science Process Skills

	n	Mean	SD	Std. Error Mean
Government Sector	70	39.96	6.51	.78
Versus Private Sector	70	42.68	4.09	.48

Here is the comparison of the Government and private schools.

Here, the scores values of the Government schools are 39.96 while the scores values of the private schools is 42.68. These results indicate that the proficiency level of the students' Science Process Skills in private schools is higher than in Government schools.

Table 15

Comparison of Male Govt students, Male Private School Students, Female Govt and Female private School Students *on Science Process Skills*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	520.14	3	173.38	7.10	.00
Within Groups	3321.08	136	24.42		
Total	3841.22	139			

The sum of the squares of boys of government and private schools and the girls of government and private schools is 520.14 within groups. And the mean square is 173.38.

The sum of squares of the boys of government and private schools and the girls of government and private schools is 3321.08 within groups. And the mean square is 24.42.

As per the results in the above table, the mean square is greater between groups than within groups.

Discussion

The current study was carried out to explore the differences between the male and female students in the science processing skills of grade 8. The population of the study was the private and Government schools of Muzaffarabad. Findings of the study indicate that there is a notable variation between male pupils' performance in Government schools and private institutions. Male pupils attending private schools performed better than those attending Government institutions.

SPS is one of the vital conditions that students are supposed to develop when learning science and are tools of the scientist hence essential for students to self-compromise through observation, questioning, experimenting, prediction, and inferring. Several studies support these skills and conclude that it is significant to enhance students' academic performance and attitude towards science and enable them learn contents with understanding and also support the development of intellectual and cognitive Process (Gizaw& Solomon, 202).

It was especially interesting to see the outcomes of female pupils attending private and government schools. While female pupils in

Government schools did not score well, those in private schools performed exceptionally well. These findings are consistent with Handayani's (2022) study, where sixth-semester students' science process skills outperformed those of fourth-semester students. Additionally, this study discovered that female students performed better as compared to male students for science process skills.

The findings of this study revealed that the male students of Government schools and the female students of Government schools also showed a remarkable difference in their results. A great difference was found between the results of Government schools' male students (38.48) and the results of private schools' female students (41.42). These values show that female students in private schools perform best. This result also indicates that private schools perform best in all.

The results of this study are in line with the results of another research conducted on the issue of "Investigation gender difference towards science process skills (SPS) using problem-based learning" by Darmaji, et., 2022). According to the average score, the results showed that the female students had a higher SPS than the male students. According to these findings, girls are more likely than boys to participate actively in practicums; this tendency derives from the students' intense curiosity. The findings of the male students in private and female schools in private also made significant differences. Here, although both are private schools but this tells that females are good at science process skills.

Conclusion

The results of Government schools' students and the results of private schools' students also made a noteworthy difference. The results show that private schools' performance was extraordinary, while the Government schools' performance was not. The findings of the current study, "Assessing students' gender, school type, and science process skills acquisition of senior secondary school students in Calabar education zone, Cross Rivers State," are corroborated by the findings of Bassey's & Amanso (2017) investigation. The results demonstrated that male science students acquire science process skills in a significantly different way than their female counterparts, and that science students from Government schools significantly differ from those from private schools in terms of calculation and inference-making abilities. However, some of the results showed no appreciable difference between private and Government school students' problem-solving skills in the science research domain.

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