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Student's Perspective: Factors Affecting the Learning of Science Process Skills (SPS)

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ABSTRACT

The current study aimed to examine the factors affecting the learning of science process skills of 8th grade students in public and private schools of Muzaffarabad. The nature of the study was quantitative. The participants in the study were all private and public schools. A basic random sample strategy was used to select 20 schools (10 private and 10 public). There were 140 students in the sample, 70 of whom were male and the remaining 70 were female. 35 of the 70 male students were drawn from five public schools, with seven students from each, and 35 were drawn from private schools, with seven students from each. Self- structured questionnaire was developed was developed with the help of supervisor and further validated by two different science specialists. The questionnaire was divided into three sections: the first concerned teaching methodologies, the second with academic values, and the third with the facilities and surroundings of the school. These have been developed in order to identify the elements that have the greatest impact on students' acquisition of science process skills. Results of the study revealed that teachers use audio visual aids and other lesson-related supporting materials in the class while teaching science, teachers make the learning easy and teachers have also helpful behavior in the classroom. The study also revealed that human beings are getting benefits from the science in daily routine life and science education is very necessary to progress. The study also showed that schools have proper sanitation system but the schools do not have the classes that can be transformed as laboratory while teaching, schools do not have the proper libraries for scientific research. The study recommended that private agencies and govt should take steps to provide sufficient funds for science equipment's in the classrooms.

Introduction

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 important outcomes or objectives of science education are the development of a scientific mindset, a favorable at titude toward science, and science process skills (Suman, 2022).

Science education is the scholarly and practical discipline concerned with the teaching, learning and assessment of science content, science process skills (SPS), and the nature of science (McComas, 2014). Science education is the scholarly and practical discipline concerned with the teaching, learning and assessment of science content, science process skills (SPS), and the nature of science (McComas, 2014).

Without any doubt, the teacher is the most crucial component of an educational system. Teachers have a greater effective influence on pupils and educational programs than any other element. Enhancing the credentials of education faculty members and student teachers enrolled in these programs is crucial (Alkan, 2016).

According to Lederman (2009), scientific inquiry and science process skills are tightly related.By creating and evaluating ideas, students should learn that scientific inquiry processes result in the production of scientific knowledge (Bybee et al., 1991).

Science Curriculum Guide (2012), states that the kindergarten to 12th Curriculum is built around the three essential elements of the idea of science. The first of these is the science content of our logical information. The other two significant aspects are science process skills (SPS) and logical perspectives and qualities. Every one of these could be applied in our own territory just as internationally (Science Curriculum Guide, 2012).

Pacia (2014) elucidated that educating and learning are long lasting cycle. The reason for educating at any level is to acquire basic changes the student. Instructors embrace various ways to deal with assistance understudies procure information, abilities and experience (Pacia, 2014).

It is thusly in light of a legitimate concern for society, and the obligation of teachers, to further develop learners' mentalities toward science, as well as to prepare pupils to live in a profoundly logical and innovative society (Ungar 2010).

Schooling is as of now insufficient to zero in just on the exchange of information and abilities. Forming understudies' perspectives, practices, and inspirations is important today for without these more extensive abilities and qualities, understudies will be caught off guard for the difficulties they, and their reality, will confront (Miller, 2017).

By uplifting outlook toward science makes the learners keener on zeroing in on science process (Zeidan & Jayos, 2015).There are different sort of strategies and teaching methods for teaching the science subject which can be used for the fruitful results. In the lecture method, mostly educator stand in front the pupils giving knowledge verbally and at times utilizing general media helps relying on their accessibility to help to clarify the idea. All things considered, instructing has rotated around the behaviorist methodology presently named as 'conventional technique' and these customary teaching rehearses incorporate talk and instructor drove exercises and for the most part, educators look prevailing all through these rehearses (Woolfolk, 2013).

The traditional methodology expects the exchange of an arranged collection of information to the learners in endorsed class time. Through customary techniques, instructors work with learners with the topic however it doesn't upgrade the inventive propensities for pupils' brains. The talk technique is a single direction stream of data with low understudy contribution. In spite of this, the 'discussion technique' urges pupils' to take part in their learning interaction by suggesting testing conversation starters and thinking about built thoughts (Neuby, 2010). It has been demonstrated that cooperative learning improves the scaffolding used to instruct LA (low-achieving) students through discussion, tutorials, and peer instruction. According to Murray & Arroyo (2002), optimal scaffolding will gradually move students toward greater comprehension and improved learning outcomes, thereby closing the skills gap between students with high academic achievement and those with low academic achievement.

In Turkey, the Ministry of National Education chose constructivism-based inquiry-based learning as their preferred teaching strategy (MoNE, 2013; 2018). Children who learn through inquiry-based methods have the chance to further explore an idea, come up with their own solutions, defend their prior knowledge, and work through difficulties from daily life. The curriculum did not solely use inquiry-based education for teaching. Alternatives included problem-based learning, debate, engineering design, and collaborative learning, all of which put students at the centre of the learning process (Anderson, 2007; Tseng, & Chin, 2012).

Review of Literature

Science processing skills

SPS is also known as experimental, procedural skills and investigating science habits of mind, scientific inquiry abilities, and inquiry process skills (Harlen, 1999; Chakraborty & Gillian, 2021).

Types of SPS

Twelve abilities were initially classified as SPS in the Science-A Process Approach project by AAAS (1967). Observing, measuring, classifying, communicating, predicting, inferring, using numbers, utilizing space/time relationships, questioning, controlling variables, hypothesizing, defining operationally, creating models, designing experiments, and interpreting data are just a few of the 15 activities that the association categorized into the SPS later in 1993. Hierarchically, SPS vary in their degree of complexity. Based

on their degree of complexity, SPS were divided into two groups by AAAS (1967): basic and integrated SPS. The SPS—observation, classification, measurement, prediction, inference, and communication—are all included in basic SPS, which are lower-level skills. Higher-level skills known as integrated SPS are typically the outcome of combining two or more fundamental skills. Identifying and managing variables, operationally defining variables, developing hypotheses, conducting experiments, creating m odels, and analyzing data are all components of integrated SPS.

Basic Science Processing Skills

Observation

Using the senses—eye, ear, skin, nose, and tongue—as well as tools that support the senses, including a telescope, microscope, and medical equipment, observation is the act of learning about things and events. In science, critical observation is an essential procedure (Kurniawati, 2021).

Measuring

Measuring is the process of giving variables values or presenting qualitative data. Instruments having predetermined units are used to do measurements. The ability to use measuring devices efficiently and do critical computations with accuracy determines how effective a measurement is(Suman, 2017).

Classifying

Classifying involves arranging items or occurrences into groups or classes according to predetermined criteria or similarities, differences, and relationships in their attributes (Suman, 2017).

Inferring

The process of generating hypotheses, potential explanations, or conclusions regarding observations based on previously available data is known as inferring. By using their ability to infer, people try to determine the reasons for the events they have witnessed. speculating on the cause of a certain incident (Kurniawati, 2021).

Use of numbers

Sorting, counting, adding, subtracting, multiplying, and dividing are all examples of using numbers (Kurniawati, 2021).

Predicting

The ability to project occurrences based on available data or to make a precise assertion about what is likely to occur in the future based on evidence is known as prediction. Critical observations, precise measurements, and prior experiences are necessary for making effective predictions (Baxter and Kurtz, 2001).

Communication

The process of describing and exchanging information—such as an action, item, or event—between individuals or systems through the use of words, symbols, drawings, diagrams, graphs, tables, figures, and other written or spoken representations is known as communication. In order to share their observations with others, students must enter the information they have obtained. Students will be able to explain natural occurrences in science class if they have strong communication abilities (Bilgin, 2006).

Questioning

Asking questions is a way to find out the reasons behind things and occurrences that occur. It starts with observations and theories and is resolved by research (Khan & Vanaja, 2019).

Integrated Science Processing Skills

Identifying and controlling variable

In experiments, variables are shifting amounts or circumstances. According to Suman (2017), the variables in the experiments are independent (the one that the experimenter manipulates), dependent (the one whose values change when the independent variable is manipulated), and controlled (the one that influences the value of the dependent variable but is held constant to counteract its effects).

Defining variables operationally

To make communications about the events under study easier, variables are operationally defined within specific bounds. It provides details to set the definitions apart from other similar events. Typically, it is predicated on the observable features of anticipated events and actions (Kurniawati, 2021).

Formulating hypotheses

Creating hypotheses involves stating a potential relationship in the natural world based on precise observations or deductions. It entails offering justifications or viable fixes for the issues noted or occurrences noted. It involves extrapolating generalizations and forecasts about a situation or occurrence from past experiences and considering the reasons behind them (Baxter & Kurtz, 2001).

Experimenting

One step in the methodical assessment of theories is experimentation. Its objective is to provide the criteria for judgment and assess the extent to which the hypothesis is true (Baxter & Kurtz, 2001).

Interpreting data

Finding relationships, associations, and links in data is an inherent talent of data interpretation. It calls for prior knowledge, observations, forecasting, deductions, and conjecture.

Modeling

Modeling is the process of arranging experimental data and representing it in terms of thought, vision, or matter (Ostlund, 1992). It involves putting a concept, thing, or event into a mental, visual, textual, or physical representation.

Objective of the Study

To investigate how these factors (Teaching methodology, academic value and learning environment) affect the learning of students' science process skills.

Research Design

This study was quantitative in nature; it carried out to find out the factors affecting science process skills of grade 8th of public and private schools in District Muzaffarabad Azad Jammu and Kashmir.

Population

All the students of 8th grade both in public and private sectors schools of District Muzaffarabad, Azad Jammu and Kashmir constituted the population from which samples were drawn for this study.

Sample

A total of 140 eighth-grade students from 10 public schools and 10 private schools in the district of Muzaffarabad, Azad Jammu and Kashmir were chosen as a sample for this study using the simple random sampling technique. Of the 140 students, 70 attended public schools and the remaining 70 attended private ones. Of the seventy students from public schools, thirty-five were male and thirty-five were female. Private schools also followed to the same policy. This strategy was used to compare the performance of males and females in science process skills in order to adjust for the equal numbers of males and females from public and private schools. Twenty schools from the Muzaffarabad area were chosen with availability in mind.

Sampling Frame

	Total	**Public 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

A questionnaire was developed for the current study with the guidance and supervision of the supervisor and two science specialists. The questionnaire was divided into three sections: the first concerned teaching methodologies, the second with academic values, and the third with the facilities and surroundings of the school. These have been developed in order to identify the elements that have the greatest impact on students' acquisition of science process skills. There were five questions in each part, for a total of fifteen questions in this questionnaire. For each question, five scales were provided, strongly disagreed, disagree, agree, disagree, and disagree passionately. The questionnaire was sent to two science specialists for validation after the first draft was completed.

Validity

The questionnaire was forwarded to two science specialists who validated it in order to verify its validity. They gave suggestions how to make the questionnaire better. The researcher adopted the recommendations for modifications made by the Science Specialists and the esteemed supervisor.

Results

The responses of the questionnaires were analyzed using SPSS. Results were presented in tables after frequencies were calculated. The percentage of each student's response is shown in each table.

Table No: 1 **Teaching Strategies**

Statements	**SA (%)**	**A (%)**	**UN (%)**	**DA (%)**	**SDA(%)**
1. Does your science teacher use Audio Visual Aids and other lesson-related supporting materials?	43 31(%)	48 34(%)	23 16(%)	21 15(%)	5 4(%)
2. Does your teacher utilize intervention materials like activity cards on intricate point?	27 19(%)	40 28(%)	26 19(%)	32 23(%)	15 11(%)
3. Is your teacher providing such activities that encourage the group work or peer work.					
4. Does your teacher make the learning easy and fun?	51 36(%)	50 36(%)	21 15(%)	13 10(%)	5 4(%)
5. Does your teacher is helpful to the students during the class?					
	46 33(%)	42 30(%)	18 13(%)	17 12(%)	16 11(%)
	54 38(%)	33 24(%)	21 15(%)	25 18(%)	7 5(%)

The above table indicates that 65% students agreed with the statement that their teacher use Audio Visual Aids and other lesson-related supporting materials in the class while teaching. On the other hand, 19% disagreed with the statement and 16% remained undecided.

The above table shows that 48% of the respondents were agreed with the statement that their teacher utilizes intervention materials like activity cards on intricate point. On the other hand, 34% of the respondents were disagreed with the statement and 19% were undecided.

This table indicates that 72% of the students were strongly agreed with the statement that their teacher provides such activities that encourage the group work or peer work in the classroom. While 13% of the students were disagreed with the statement and 15% remained undecided.

The above-mentioned table shows 63% of the respondents were strongly agreed with the statement that their teacher makes the learning easy and fun. On the other hand 24% were disagreed with the statement and 13% were remained undecided.

The above table indicates 62% of the students were strongly agreed with the statement that their teacher is helpful to the students during the class. While 23% of the students were disagreed with the statement and 15 % were remained undecided.

Table No: 2Academic Value

Statements	SA (%)	A (%)	UN (%)	DA (%)	SDA(%)
1. Are human beings getting benefits from science education?	56 40(%)	36 26(%)	21 15(%)	15 11(%)	12 8(%)
2. Does science education essential to our everyday life?	56 40(%)	48 34(%)	15 11(%)	14 10(%)	7 5(%)
3. Is a science education indispensable step in achieving the dreams?	44 31(%)	42 30(%)	35 25(%)	13 10(%)	6 4(%)
4. Are you working hard for taking high grade?	56 40(%)	40 29(%)	19 14(%)	15 11(%)	10 7(%)
5.You believe that science can lead the way to a better future?	44 31(%)	30 21(%)	24 17(%)	21 15(%)	21 15(%)

Note. SA = Strongly Agree; A = Agree; UN = Undecided; DA = Disagree; SDA = Strongly Disagree.

This table indicates that 66% of the respondents were strongly agreed with the statement that human beings getting benefits from the science education. On the other hand 19% were disagreed with the statement and 15 % remained undecided.

This table indicates that 74% of the respondents were strongly agreed with the statement that science education is essential for everyday life. On the other hand 15% were disagreed with the statement and 11 % remained undecided.

This table indicates that 61% of the respondents were strongly agreed with the statement that science education is indispensable step in achieving the dreams. On the other hand 14% were disagreed with the statement and 25 % remained undecided.

This table indicates that 53% of the respondents were strongly agreed with the statement that they believe that science can lead the way to a better life. On the other hand 30% were disagreed with the statement and 17 % remained undecided.

Table No: 3 School Environment and Facilities

Statements	SA (%)	A (%)	UN (%)	DA (%)	SDA(%)
1. Does your school have sufficient tools for the activities of science?	15 11(%)	18 12(%)	28 20(%)	34 24(%)	44 31(%)
2. Does your classroom environment permit you to learn the science as well as SPS fully?	13 9(%)	25 18(%)	22 16(%)	37 26(%)	43 31(%)
3. Does your school have a classroom that transforms into a laboratory?	17 12(%)	21 15(%)	26 19(%)	28 20(%)	48 34(%)
4. Is there a library with the latest science books which can be consulted for research?	26	19	24	24	47
5. Does your school follow the proper sanitation system?					

	19(%)	14(%)	17(%)	17(%)	34(%)
	38 27(%)	39 28(%)	28 20(%)	14 10(%)	21 15(%)

The above table indicates that 56% of the respondents were disagreed with the statement that their schools have sufficient tools for the activities of science. On the other hand 24% were agreed with the statement and 20 % remained undecided.

The table indicates that 57% of the respondents were strongly disagreed with the statement that their classroom environment permits them to learn science as well as SPS fully. On the other hand 27% were agreed with the statement and 15 % remained undecided

The table indicates that 54% of the respondents were strongly disagreed with the statement that their school does not have a classroom that can transform into a laboratory. On the other hand 24% were agreed with the statement and 19 % remained undecided

The table indicates that 51% of the respondents were strongly disagreed with the statement that there is a library with the latest science books which can be consulted for research On the other hand 32% were agreed with the statement and 17% remained undecided

The table indicates that 55% of the respondents were agreed with the statement that their school follow the proper sanitation system. On the other hand 25% were strongly disagreed with the statement and 20 % remained undecided.

Discussions

The study aimed to explore the factors that affect the science process skill of 8th grade students in learning science in public and private schools of Muzaffarabad. Science education is the core subject of any school curriculum from lower level to high level. This knowledge is further transferred to students by the teachers in the classroom. Teachers own their responsibility to teach it effectively through experimentation and different teaching strategies. Results of the current study showed that the teachers in selected schools use audio visual aids in teaching science for effective learning. Audio visual aids help teacher to teach complex topic in an easy way. The Study of Lapada, (2017), supported the results of this study. According to him, students who received teaching using audio-visual aids outperformed those who received instruction using the traditional technique. The findings of this study are similarly consistent with another study by Azhar, Niwaz, and Khan (2017). They advised teachers to employ inexpensive resources like A.V. Aids whenever feasible or when they believe it will benefit science classes. Since the use of low-cost materials as A.V. aids was successful for primary school science students, it was suggested that low-cost materials be employed as a teaching technique for science at the primary school level. Teachers can use inexpensive resources like A.V. Aids to boost students' interest, particularly in the subject of Science. The study of Vishnupriya,S., & Bharathi, R. (2022), also supported the results of this study.The findings of this study suggest that the use of audio visual aids as teaching tools have helped them to increase or enhance their learners' learning abilities.

The study also concluded that science education is important for human beings. All are getting benefits from science education in our daily life. It makes our life easier and comfortable. The study of Suman, (2022), 'Developing Science Process Skills for Effective Science Learning' is also supporting the results of this study. The study drawn the conclusion that the formation of a scientific mindset, a good attitude toward science, and science process skills are all seen as significant results or objectives of science education. It has also been recognized that without cultivating these attributes, scientific knowledge makes minimal contributions to social change and national progress. For this reason, science education places a strong emphasis on the development of a scientific mindset and other essential abilities through science instruction.

The study also revealed that the classrooms in the schools could not be transformed in to laboratory while teaching science. There is non-availability of libraries in the schools. Some schools have libraries but mostly don't have and the students are working hard to get good grades in the subject of science. Holbrook, (2010) highlighted the role of schools in promoting science education. The study's main focus was on "Education through science," which reflects the belief that schools should help students develop their future skills regardless of their chosen career path, the role that students will play in society as future citizens, or education through science as a motivating innovation for science education for all higher education emphasis. Therefore, "education through science"

is synonymous with education through other, non-scientific school subjects, allowing students to receive the necessary resources to meet the educational objectives.

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