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Research Article

Availability, Accessibility, and Teachers' Utilization of Science Laboratory Resources in Public Secondary Schools of Ilocos Norte

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ABSTRACT

Access to basic educational facilities is vital for creating an ideal learning environment. The establishment of science laboratories provides educators with essential resources to expound abstract scientific concepts, hence, improving student understanding. This study intended to assess the availability and level of utilization of science laboratory resources in Public Secondary Schools of Ilocos Norte. The study followed descriptive research methodology and purposive sampling to collect data from 198 Junior and Senior High School Science teachers. The instruments used for the study was adapted from DO # 17, s. 2017, and DO # 42, s. 2006. The results of the study indicated that in most participating schools; basic science laboratory apparatuses are highly available. However, majority of the schools are highly inadequate with advanced laboratory apparatus and laboratory chemicals. Moreover, this study revealed that most schools do not have their separate dark rooms and shower rooms. In terms of level of utilization, there is no apparatus that is Always utilized, and dark room is Never utilized. The study recommended for a nationwide or regional survey of schools to evaluate the availability of science laboratory resources and correlate this information with student performance indicators. The researchers suggest on analysing current policies on scientific education funding and resource allocation that would targets areas for enhancement and promote equal distribution of resources. These will enable the establishment of adequate science laboratories and resources in all schools to enhance the effective teaching and learning of science.

Keywords: *Science laboratory, Availability of science laboratory resources, Level of utilization, Science teachers, Laboratory apparatus, Laboratory facilities*

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Introduction

Accessibility to fundamental educational facilities is essential for achieving an optimal environment for learning. Sufficient facilities are crucial to enhance retention of the concepts that educators aim to convey in the thinking skills of the younger generations. This is particularly vital for scientific learning mainly because it helps them more effectively grasp the abstract ideas in the field of science. The development of science laboratories enables teachers with the necessary resources to further explain abstract scientific topics, thus enhancing the comprehension of learners.

Scientific laboratories are essential for acquiring knowledge, interpreting, and grasping scientific concepts. (Caballes et al, 2024). A laboratory is a space furnished with scientific equipment and materials, where students can manipulate and participate through observations and activities, either independently or collaboratively. The facility provides students the opportunity to apply scientific concepts in practice. The science laboratory fosters students' enthusiasm for learning and enhances their critical and higher-order thinking skills. Moreover, it promotes collaboration and effective communication skills, as scientific laboratory activities require collective efforts to accomplish a designated task.

Research indicates an acceptable connection between the use of laboratory resources and academic achievement in subjects related to science. Effective engagement in science education is closely linked to access to these resources; students who perceive they have adequate access tend to be more engaged in their learning activities (Lazaro & Paglinawan, 2025). Scientific laboratories are essential in the education and training of students, providing them with hands-on experiences that complement the theoretical knowledge gained in the classroom (DeFeo et al, 2020). Emyur and Cetin (2024) believed that practical experiments enable students to link theoretical information with real-world applications, consequently enhancing their interest and understanding of scientific principles. Laboratory activities foster problem solving and critical thinking skills, which are essential components of scientific literacy (Luftia, Wilujeng, & Zakwandi, 2024). Abidoye et al. (2022) found that the availability of laboratory facilities plays a crucial role in enhancing students' academic performance in basic science.

Effective utilization of science laboratories is essential for enhancing students' academic achievement and developing their practical skills. The effectiveness of resource utilization is closely linked to teacher training and commitment. Studies show that teachers who are well-trained and motivated are more likely to engage students in practical activities, thereby improving learning outcomes (Etiubon & Udoh, 2020), (Duban et al, 2019). One study found that problem-based learning, an approach that emphasizes the use of laboratories, can be an effective teaching strategy for improving secondary students' performance in science (Funa & Prudente, 2021) Additionally, the development of teaching materials that leverage science laboratories can increase students' science literacy abilities (Sari et al, 2018).

Furthermore, it is essential to have enough laboratory teaching kits and resources to ensure that teaching and studying science topics is interesting and will encourage the learners to appreciate the beauty of the scientific world. Additionally, scientific labs increase students' motivation to learn and enhance their higher-order and critical thinking abilities. Furthermore, because scientific lab activities require teamwork to complete a certain objective, they help promote cooperation and effective communication skills. The integration of laboratory-based learning with STEM education has been a growing trend, highlighting the need for a comprehensive understanding of the status and utilization of these facilities (Rahman, 2021).

Research has revealed that many secondary schools in the Philippines lack adequate science laboratory facilities and resources. The status of science laboratories in the public junior high school in the Philippines is inadequate, which significantly hinders the teaching and learning of science. The lack of appropriate materials, equipment, and

sufficient laboratory space directly affects students' ability to engage in meaningful hands-on scientific experiences (de Borja & Marasigan, 2020). A study conducted by Noroña (2021), in Eastern Samar, Philippines revealed significant disparities on the accessibility of laboratory resources in secondary schools. Only 25% of teachers reported having adequate access to necessary resources, highlighting systemic inequities. Subsequently, Mangarin and Macayana (2024) found that out of approximately 12,390 high schools in the Philippines, around 4,520 lack dedicated science laboratories. Many existing facilities are outdated and do not meet modern educational standards. This scarcity severely limits students' opportunities for experiential learning, which is essential for cultivating scientific competencies. A study conducted in Davao del Sur, Philippines reported compliance rates for science laboratories at 69.04% for facilities, 65.59% for equipment, and only 43.33% for materials, indicating a fair to good status but highlighting significant gaps in resource availability (Cabales et al, 2024). In addition, the availability of laboratory resources varies significantly by regions in the Philippines. Regions III, IV-A, X, XI, XII, and the National Capital Region are particularly affected by shortages, which contribute to poor performance in science subjects among students (Nuevo, 2024).

Abbey-Kalio (2024) noted that despite some availability of resources, many schools report that laboratory equipment is underutilized. Factors contributing to this include inadequate training for teachers, lack of maintenance for existing equipment, and insufficient access to necessary materials. In like manner, Sani et al. (2024) revealed that some laboratories report adequate availability of equipment, many still struggle with insufficient resources to accommodate all students effectively. The insufficient and inadequate equipment negatively impacts the quality of science education. If students cannot perform experiments or use relevant apparatus, their learning experience becomes limited, leading to gaps in knowledge and skills essential for their future careers in science.

Effective learning relies heavily on practical experiences facilitated by these resources. However, many students experience diminished interest in science due to limited practical engagement. The reliance on traditional teaching methods often prevails due to resource constraints. Educators frequently resort to demonstrations, lectures and textbook learning instead of interactive laboratory activities, further hindering student engagement and understanding (Nuevo, 2024), (Abbey-Kalio, 2024).

Furthermore, Pareek (2019) enumerated the several factors that hampers the effectiveness of laboratory resources: 1) inadequate equipment: many schools lack essential tools and materials necessary for conducting experiments, 2) overcrowded classrooms: high student-to-teacher ratios make it difficult to conduct hands-on activities effectively, 3) lack of training: teachers often report insufficient training in utilizing laboratory equipment, which further limits effective teaching practices. In the study of Mangarin and Macayana (2024), it was revealed that the lack of science laboratories and equipment is a multifaceted problem deeply rooted in budgetary constraints, mismanagement of funds, inequitable resource distribution, and inadequate teacher training.

UNESCO has launched the Remote Access to Lab Equipment (UNESRALE) initiative aimed at improving access for scientists in the Global South, particularly in Africa. This initiative seeks to bridge the knowledge gap by enabling remote access to sophisticated laboratory equipment, thus allowing local scientists to conduct research without relocating. The program also includes training for users on how to operate this equipment effectively. In spite this initiative, it was not enough to alleviate the lack availability and utilization of laboratory resources.

Challenges persist which impede the effective utilization of scientific laboratories, including inadequate teacher training and support, insufficient physical infrastructure, and a lack of financing for laboratory equipment and supplies. However, the status and level of utilization of science laboratories in many educational institutions remain a

concern. Researchers have highlighted the need for a thorough examination of how science laboratories are being used in schools.

Therefore, this study arose within the aforementioned context. It aimed to investigate the status and level of utilization of science laboratory resources. Moreover, it assessed the availability of laboratory resources based from the Department of Education (DepEd) Guidelines for the Provision of Science and Mathematics Equipment as stipulated from DepEd Order # 17, s. 2017 and DepEd Guidelines for the Prescribed Science Laboratory School Facilities specified from DepEd Order # 42, s. 2006.

Research Questions

This study aimed to investigate the status and level of utilization of science laboratory resources in public secondary schools in the Schools Division of Ilocos Norte.

Specifically, this sought to answer the following questions:

1. What is the status of science laboratory resources in public secondary schools in terms of:
   1.1. availability and accessibility of laboratory apparatus; and
   1.2. availability and accessibility of laboratory supplies, and facilities?
2. What is the level of utilization of science teachers of the laboratory resources?

Methods

Design

This study follows the descriptive research design. It is descriptive because it aimed to determine the status and the level of utilization of laboratory resources among Public Secondary Schools of Ilocos Norte.

Descriptive research methodology is focused on describing the current situation of laboratory resources. Descriptive research method, like survey is used for gathering data on existing conditions. In this case, the researchers used this method to collect data on the availability and utilization of laboratory resources in the schools. To give a clear image of the current situation, the study concentrated on giving a comprehensive description of the currently available laboratory resources, exactly what descriptive research is intended to do.

Sample and Data Collection

The researchers employed purposive sampling to collect data from 198 Junior and Senior High School Science teachers currently teaching in the Schools Division of Ilocos Norte.

The research instrument used in the study was adapted from DepEd Guidelines for the Provision of Science and Mathematics Equipment (DO # 17, s. 2017), and DepEd Guidelines for the Prescribed Science Laboratory School Facilities (DO # 42, s. 2006). To investigate the status and utilization of these laboratory resources present in every school, materials and resources are explicitly listed to understand the state of laboratories in the division. Laboratory resources are delimited to apparatus, supplies and facilities.

Throughout the conduct of this research study, the researchers were guided by the following series of steps and procedures. Ethical permission was obtained from the University Research Ethics and Review Board (URERB) before the distribution of the questionnaire to the Schools Division of Ilocos Norte and the selected respondents. Letters requesting permission to conduct the study were obtained from the Schools Division Superintendent of Ilocos Norte Division. Following the approval of the requests, data collection proceeded. The researchers also sought permission from the Schools Division Office of Ilocos Norte to post the online survey questionnaire on the SDOIN Facebook Infoboard for it to reach the selected Science teachers in the entire division.

Data Analysis

Frequency counts, and percentage were utilized to determine the availability of science laboratory resources in terms of laboratory apparatus, supplies and facilities. Mean with corresponding descriptive interpretation was used to analysed the level of utilization of laboratory apparatus, supplies, and facilities. The descriptive interpretation together with its associated mean ranges is as follows: 4.20-5.00 (Always); 3.40-4.19 (Often); 2.60-3.39

(Sometimes); 1.81-2.59 (Rarely); 1.00-1.80 (Never).

Result and Discussion

Availability of Laboratory Apparatus

The frequency and percentage distribution of the availability and unavailability of laboratory apparatus are shown in Table 1. Results show that 198 (100%) teachers in their respective schools have beaker, Erlenmeyer flask, graduated cylinder, and test tube. It is also notable that tripod, alcohol burner, mortar and pestle, evaporating dish, thermometer, triple beam balance, compound microscope, glass slides, rubber stopper, stirring rod, glass funnel, test tube racks, and tong obtained above 180 (90%) availability and below 18 (9%) unavailability. Burrete, dissecting set, human torso, safety googles, wire gauze, cork stopper, hand gloves, watch glass, Bunsen burner, test tube brush, volumetric flask, alligator wires and clips, filter paper, wash bottle, aspirator, basic lens set, Florence flask, hand lens, spatula, syringe, basic electronics ki, iron clamp, ring, and stamp, litmus paper, rock sample, distilling flask, dry cell, graduated pipette, and light bulb obtained more than 159 (80%) availability and below 40 (20%) unavailability.

Significant among the findings are the lab apparatus and materials which are air blower, bromothymol blue, electronic balance, ripple tank set, hydrometer, LPG Tank, open U-tube manometer, Sodium hydroxide, vacuum tube, magnetic stirrer, resonance tube, mechanical wire cutter, Sodium sulfate, Potassium chloride, ball peen hammer, loudspeaker, osmosis apparatus, Phenolphthalein indicator, Potassium iodide, precision screwdriver set, Sulfuric acid, yeast, and digital Geiger-muller counter acquired below 60 (30%) availability and above 138 (69%) unavailability. Notable from the results are the laboratory apparatus and materials such as Manganese dioxide, Zinc Metal, Engine Model, Halogen Tube, Musical Instrument, Sound Signal Generator Kit, Zinc chloride, Zinc Nitrate, Coefficient of Linear Expansion apparatus, Gentian Violet, and laboratory oven garnered below 40 (20%) availability and above 159 (80%) unavailability.

Based from the results, most apparatus that are available in the public secondary schools in Ilocos Norte are the basic science laboratory apparatus which are beaker, Erlenmeyer flask, graduated cylinder, test-tube, test-tube racks, tripod, alcohol burner, mortar and pestle, evaporating dish, thermometer, triple balance beam, and compound microscope. Prominent among the findings that are unavailable to majority of schools are laboratory chemicals such as bromothymol blue, Sodium hydroxide, Sodium sulfate, Potassium chloride, Phenolphthalein indicator, Potassium iodide, Sulfuric acid, yeast, Manganese dioxide, Zinc Metal, Zinc chloride, and Zinc nitrate.

Table 1. Availability of Laboratory Apparatus

Name of Apparatus	Available		Unavailable	
	f	%	*f*	%
Advanced Electro magnetism Kit	99	50	99	50
Air Blower	60	30.30	138	69.70
Alcohol Burner	192	96.97	6	3.03
Alligator Wires and Clips	168	84.85	30	15.15
Ammeter	147	74.24	51	25.76
Ammonium Chloride	75	37.88	123	62.12
Archimedes Principle Set	81	40.91	117	59.09
Aspirator	165	83.33	33	16.67
Astronomy Multimedia Package	87	43.94	111	56.06
Ball Peen Hammer	45	22.73	153	77.27
Basic Electronics Kit	162	81.82	36	18.18
Basic Lens Set	165	83.33	33	16.67

Name of Apparatus	Available		Unavailable	
	f	%	*f*	%
Beaker	198	100.00	0	0.00
Benedict's Solution	102	51.52	96	48.48
Beral Pipette Dropper	123	62.12	75	37.88
Bromo thymol Blue	60	30.30	138	69.70
Boric Acid	75	37.88	123	62.12
Bunsen Burner	171	86.36	27	13.64
Burette	177	89.39	21	10.61
Calcium Chloride	72	36.36	126	63.64
Calcium Sulfate	66	33.33	132	66.67
Calorimeter	75	37.88	123	62.12
Centrifuge	63	31.82	135	68.18
Coefficient of Linear Expansion Set	21	10.61	177	89.39
Compound Microscope	186	93.94	12	6.06
Condenser	81	40.91	117	59.09
Conical Flask	87	43.94	111	56.06
Cork Borers	111	56.06	87	43.94
Cork Stopper	174	87.88	24	12.12
Crucible	153	77.27	45	22.73
DC String Vibrator	75	37.88	123	62.12
Diffraction Grating Set	69	34.85	129	65.15
Digital Geiger-Muller Counter	42	21.21	156	78.79
Digital Microscope	63	31.82	135	68.18
Dissecting Set	177	89.39	21	10.61
Distilling Flask	159	80.30	39	19.70
Dry Cell	159	80.30	39	19.70
Dry Cell Holder	150	75.76	48	24.24
Electrolysis Apparatus	87	43.94	111	56.06
Electronic Balance	60	30.30	138	69.70
Engine Model	36	18.18	162	81.82
Erlenmeyer Flask	198	100.00	0	0.00
Evaporating Dish	189	95.45	9	4.55
Ferrous Sulfate	75	37.88	123	62.12
Filter Paper	168	84.85	30	15.15
Flatbottomed Flask	111	56.06	87	43.94
Florence Flask	165	83.33	33	16.67
Force Table	69	34.85	129	65.15
Fuse and Fuse Holder	90	45.45	108	54.55
Galvanometer	114	57.58	84	42.42
Gentian Violet	18	9.09	180	90.91
Glass Cover Slips	153	77.27	45	22.73
Glass Funnel	183	92.42	15	7.58
Glass Slides	186	93.94	12	6.06
Glass Tubing	141	71.21	57	28.79
Graduated Cylinder	198	100.00	0	0.00
Graduated Pipette	159	80.30	39	19.70
Halogen Tube	33	16.67	165	83.33
Hand Gloves	174	87.88	24	12.12

Name of Apparatus	Available		Unavailable	
	f	%	*f*	%
Hand Lens	165	83.33	33	16.67
Hot Plate	111	56.06	87	43.94
Human Torso	177	89.39	21	10.61
Hydro chloric Acid	87	43.94	111	56.06
Hydrometer	57	28.79	141	71.21
Inorganic/ Organic Molecular Model Set	117	59.09	81	40.91
Iodine Solution	117	59.09	81	40.91
Iron Clamp, Ring, and Stamp	162	81.82	36	18.18
Laboratory Oven	15	7.58	183	92.42
Laser Light	96	48.48	102	51.52
Light Bulb	159	80.30	39	19.70
Litmus Paper	162	81.82	36	18.18
Long Nose Pliers	93	46.97	105	53.03
Loudspeaker	45	22.73	153	77.27
LPG Tank	57	28.79	141	71.21
Magnesium Ribbon	75	37.88	123	62.12
Magnetic Stirrer	54	27.27	144	72.73
Manganese Dioxide	39	19.70	159	80.30
Mechanical Wire Cutter	51	25.76	147	74.24
Mirror Set	126	63.64	72	36.36
Mitosis and Meiosis Model	120	60.61	78	39.39
Molecular Geometry Set	120	60.61	78	39.39
Mortar And Pestle	192	96.97	6	3.03
Motor-Generator Model Set	99	50.00	99	50.00
Multimeter	126	63.64	72	36.36
Musical Instrument	33	16.67	165	83.33
Open U-Tube Manometer	57	28.79	141	71.21
Optical Bench Set	63	31.82	135	68.18
Osmosis Apparatus	45	22.73	153	77.27
Petri Dish	189	95.45	9	4.55
pH Meter	123	62.12	75	37.88
Phenol phthalein Indicator	45	22.73	153	77.27
Potassium Chloride	48	24.24	150	75.76
Potassium Iodide	45	22.73	153	77.27
Power Supply	153	77.27	45	22.73
Precision Screwdriver Set	45	22.73	153	77.27
Prism	141	71.21	57	28.79
Reagent Bottle	156	78.79	42	21.21
Resistance Board	69	34.85	129	65.15
Resonance Tube	54	27.27	144	72.73
Ripple Tank Set	60	30.30	138	69.70
Rock Sample	162	81.82	36	18.18
Rubber Stopper	186	93.94	12	6.06
Safety Goggles	177	89.39	21	10.61
Screwdriver	117	59.09	81	40.91
Slinky Coil	114	57.58	84	42.42
Sodium Sulfate	51	25.76	147	74.24

Name of Apparatus	Available		Unavailable	
	f	%	*f*	%
Sodium Hydroxide	57	28.79	141	71.21
Soldering Iron	75	37.88	123	62.12
Sound Signal Generator Kit	33	16.67	165	83.33
Spatula	165	83.33	33	16.67
Speedometer	81	40.91	117	59.09
Spring Balance	156	78.79	42	21.21
Stirring Rod	186	93.94	12	6.06
Strobe Light	66	33.33	132	66.67
Sulfuric Acid	45	22.73	153	77.27
Sulfur Powder	51	25.76	147	74.24
Switches	126	63.64	72	36.36
Syringe	165	83.33	33	16.67
Telescope	69	34.85	129	65.15
Test Tube	198	100.00	0	0.00
Test Tube Brush	171	86.36	27	13.64
Test Tube Racks	183	92.42	15	7.58
Thermo meter	189	95.45	9	4.55
Tong	180	90.91	18	9.09
Triangular File	75	37.88	123	62.12
Triple Beam Balance	189	95.45	9	4.55
Tripod	195	98.48	3	1.52
Tuning Fork	156	78.79	42	21.21
Tweezer	132	66.67	66	33.33
Universal pH Paper	99	50.00	99	50.00
Vacuum Tube	57	28.79	141	71.21
Vial	141	71.21	57	28.79
Voltmeter	111	56.06	87	43.94
Volumetric Flask	171	86.36	27	13.64
Wash Bottle	168	84.85	30	15.15
Watch Glass	174	87.88	24	12.12
Wire Gauze	177	89.39	21	10.61
Yeast	45	22.73	153	77.27
Zinc Chloride	30	15.15	168	84.85
Zinc Metal	39	19.70	159	80.30
Zinc Nitrate	24	12.12	174	87.88

Availability of Laboratory Supplies and Facilities

The frequency and percentage of the availability and unavailability of laboratory supplies and facilities are shown in Table 2. Results show that 198 (100%) teachers in their respective schools have cabinets inside the science laboratory. Electric fan, and electricity gained 186 (93.94%) availability and 12 (6.06%) unavailability. First aid kit obtained 180 (90.91%) availability and 18 (9.09%) unavailability. Fire extinguisher got 159 (80.3%) availability and 39 (19.7%) unavailability. Moreover, water supply gained 153 (77.27%) and 45 (22.73%) unavailability, while sinks obtained 150 (75.76%) availability and 48 (24.24%) unavailability. Storage room garnered 141 (71.21%) availability and 87 (43.94%) unavailability. Benches 108(54.55%) availability and 90 (45.45%) unavailability, shower room which obtained 87 (43.94%) availability and 111(56.06%) unavailability,

while air conditioning unit garnered 84 (42.42%) availability and 114 (57.58%) unavailability. The most noteworthy finding was that there were 171 (86.36%) dark rooms unavailable in Ilocos Norte's public secondary schools.

Table 2. Availability of Laboratory Supplies and Facilities

Name of Laboratory Supplies and Facilities	Available		Unavailable	
	f	%	*f*	%
Air Conditioning Unit	84	42.42	114	57.58
Benches	108	54.55	90	45.45
Cabinet	198	100.00	0	0.00
Dark Room	27	13.64	171	86.36
Electric Fans	186	93.94	12	6.06
Electricity	186	93.94	12	6.06
Fire Extinguisher	159	80.30	39	19.70
First Aid Kit	180	90.91	18	9.09
Shower Room	87	43.94	111	56.06
Sinks	150	75.76	48	24.24
Storage Room	141	71.21	87	43.94
Water Supply	153	77.27	45	22.73

Level of Utilization of Laboratory Apparatus

The mean and descriptive interpretation of level of utilization of the laboratory apparatus and materials are shown in Table 3. Thirteen (13) apparatus such as beaker, test-tube, thermometer, compound microscope, test-tube racks, graduated cylinder, test-tube brush, safety googles, tong, hand gloves, human torso, glass slides, and stirring rod obtained mean ratings between 3.88 to 3.5, consequently it is Often utilized during science laboratory activities. In addition, forty (40) laboratory apparatus are Sometimes used in science laboratory activities, and obtained 3.27 to 2.62 mean ratings. These are some of the apparatuses that are sometimes used including mortar and pestle, power supply, tripod, evaporating dish, syringe, triple beam balance, filter paper, litmus paper, Erlenmeyer flask, hand lens, light bulb, petri dish, alcohol burner, and basic lens set.

Subsequently, sixty-eight (68) laboratory apparatus are Rarely utilized on science laboratory activities, these apparatus and materials obtained mean ratings between 2.59 to 1.80. Some of the apparatus includes force table, molecular geometry set, ammeter, galvanometer, Florence flask, pH meter, advanced electromagnetism set, iodine solution, Sodium hydroxide, Calcium chloride, Sodium sulfate, Sulfuric acid, Potassium chloride, Boric acid, and Zinc chloride. Furthermore, there are twenty (20) laboratory apparatus that are Never utilized with mean rating between 1.80 to 1.53. These apparatuses and materials are centrifuge, osmosis apparatus, open U-tube manometer, hydrometer, sound signal generator kit, engine model, resonance tube, halogen tube, digital Geiger-muller counter, laboratory oven, coefficient of linear expansion set, Phenolphthalein indicator, gentian violet, Bromothymol blue, sulfur powder, Zinc metal, Zinc nitrate, and Manganese dioxide.

Based from the results on the level of utilization of laboratory apparatus there is no apparatus that is Always utilized during science laboratory activities. However, thirteen (13) laboratory apparatus are Often utilized, while forty (40) laboratory apparatus are Sometimes used, sixty-eight (68) laboratory apparatus are Rarely operated, and twenty (20) laboratory apparatus that are Never utilized.

Table 3. Level of Utilization of Laboratory Apparatus

Name of Apparatus	Mean	Descriptive Interpretation
Advanced Electro magnetism Kit	2.17	Rarely
Air Blower	2.00	Rarely
Alcohol Burner	3.08	Sometimes
Alligator Wires and Clips	2.73	Sometimes
Ammeter	2.53	Rarely
Ammonium Chloride	2.85	Sometimes
Archimedes Principle Set	1.89	Rarely
Aspirator	2.48	Rarely
Astronomy Multimedia Package	2.29	Rarely
Ball Pen Hammer	1.92	Rarely
Basic Electronics Kit	2.73	Sometimes
Basic Lens Set	3.05	Sometimes
Beaker	3.88	Often
Benedict's Solution	2.24	Rarely
Beral Pipette Dropper	1.94	Rarely
Bromothymol Blue	1.74	Never
Boric Acid	1.85	Rarely
Bunsen Burner	2.76	Sometimes
Burette	2.29	Rarely
Calcium Chloride	1.94	Rarely
Calcium Sulfate	1.82	Rarely
Calorimeter	1.85	Rarely
Centrifuge	1.80	Never
Coefficient of Linear Expansion	1.53	Never
Compound Microscope	3.76	Often
Condenser	2.11	Rarely
Conical Flask	1.94	Rarely
Cork Borers	2.11	Rarely
Cork Stopper	2.71	Sometimes
Crucible	2.58	Rarely
DC String Vibrator	1.95	Rarely
Diffraction Grating Set	1.85	Rarely
Digital Geiger-Muller Counter	1.68	Never
Digital Microscope	2.00	Rarely
Dissecting Set	2.74	Sometimes
Distilling Flask	2.48	Rarely
Dry Cell	2.80	Sometimes
Dry Cell Holder	2.65	Sometimes
Electrolysis Apparatus	2.02	Rarely
Electronic Balance	2.02	Rarely
Engine Model	1.73	Never
Erlenmeyer Flask	3.14	Sometimes
Evaporating Dish	3.26	Sometimes
Ferrous Sulfate	1.86	Rarely
Filter Paper	3.21	Sometimes
Flat-bottomed Flask	2.23	Rarely

Name of Apparatus	Mean	Descriptive Interpretation
Florence Flask	2.50	Rarely
Force Table	1.98	Rarely
Fuse and Fuse Holder	2.09	Rarely
Galvano meter	2.05	Rarely
Gentian Violet	1.64	Never
Glass Cover Slips	2.94	Sometimes
Glass Funnel	3.05	Sometimes
Glass Slides	3.52	Often
Glass Tubing	2.27	Rarely
Graduated Cylinder	3.68	Often
Graduated Pipette	2.64	Sometimes
Halogen Tube	1.68	Never
Hand Gloves	3.59	Often
Hand Lens	3.11	Sometimes
Hot Plate	2.29	Rarely
Human Torso	3.58	Often
Hydro chloric Acid	2.05	Rarely
Hydrometer	1.76	Never
Inorganic/ Organic Molecular Model Set	2.41	Rarely
Iodine Solution	2.24	Rarely
Iron Clamp, Ring, and Stamp	2.62	Sometimes
Laboratory Oven	1.61	Never
Laser Light	2.38	Rarely
Light Bulb	3.11	Sometimes
Litmus Paper	3.17	Sometimes
Long Nose Pliers	2.24	Rarely
Loudspeaker	2.12	Rarely
LPG Tank	1.77	Never
Magnesium Ribbon	1.97	Rarely
Magnetic Stirrer	1.79	Never
Manganese Dioxide	1.71	Never
Mechanical Wire Cutter	1.92	Rarely
Mirror Set	2.82	Sometimes
Mitosis and Meiosis Model	2.91	Sometimes
Molecular Geometry Set	2.58	Rarely
Mortar And Pestle	3.27	Sometimes
Motor-Generator Model Set	2.09	Rarely
Multimeter	2.30	Rarely
Musical Instrument	1.92	Rarely
Open U-Tube Manometer	1.77	Never
Optical Bench Set	1.86	Rarely
Osmosis Apparatus	1.80	Never
Petri Dish	3.09	Sometimes
pH Meter	2.48	Rarely
Phenol phthalein Indicator	1.77	Never
Potassium Chloride	1.88	Rarely
Potassium Iodide	1.83	Rarely
Power Supply	3.27	Sometimes

Name of Apparatus	Mean	Descriptive Interpretation
Precision Screwdriver Set	1.88	Rarely
Prism	2.86	Sometimes
Reagent Bottle	2.68	Sometimes
Resistance Board	1.98	Rarely
Resonance Tube	1.71	Never
Ripple Tank Set	1.85	Rarely
Rock Sample	3.05	Sometimes
Rubber Stopper	2.94	Sometimes
Safety Goggles	3.61	Often
Screwdriver	2.56	Rarely
Slinky Coil	2.76	Sometimes
Sodium Sulfate	1.94	Rarely
Sodium Hydroxide	2.06	Rarely
Soldering Iron	2.03	Rarely
Sound Signal Generator Kit	1.76	Never
Spatula	3.05	Sometimes
Speedometer	2.12	Rarely
Spring Balance	2.67	Sometimes
Stirring Rod	3.50	Often
Strobe Light	1.85	Rarely
Sulfuric Acid	1.89	Rarely
Sulfur Powder	1.77	Never
Switches	2.67	Sometimes
Syringe	3.26	Sometimes
Telescope	2.02	Rarely
Test Tube	3.88	Often
Test Tube Brush	3.67	Often
Test Tube Racks	3.76	Often
Thermo meter	3.80	Often
Tong	3.61	Often
Triangular File	2.14	Rarely
Triple Beam Balance	3.26	Sometimes
Tripod	3.27	Sometimes
Tuning Fork	2.59	Rarely
Tweezer	2.64	Sometimes
Universal pH Paper	2.15	Rarely
Vacuum Tube	1.83	Rarely
Vial	2.56	Rarely
Voltmeter	2.29	Rarely
Volumetric Flask	2.38	Rarely
Wash Bottle	2.65	Sometimes
Watch Glass	2.98	Sometimes
Wire Gauze	3.11	Sometimes
Yeast	2.02	Rarely
Zinc Chloride	1.82	Rarely
Zinc Metal	1.76	Never
Zinc Nitrate	1.73	Never

Level of Utilization of Laboratory Supplies and Facilities

The mean and descriptive interpretation of level of utilization of the laboratory supplies and facilities are shown in Table 4. The results shows that electricity, electric fans, and cabinets are Always utilized with mean rating between 4.45 to 4.33. While first aid kit, water supply, and sinks are Often utilized with mean rating between 3.91 to 3.48. Storage room, benches, and fire extinguisher are Sometimes used with mean rating of 3.30 to 2.82. In addition, shower room and air conditioning unit with mean rating between 2.32 to 2.14 are Rarely utilized science laboratory facilities. Consequently, a significant finding in this study is that dark room is Never utilized given a mean rating of 1.76.

Table 4. Level of Utilization of Laboratory Supplies and Facilities

Name of Laboratory Supplies and Facilities	Mean	Descriptive Interpretation
Air Conditioning Unit	2.14	Rarely
Benches	2.91	Sometimes
Cabinet	4.33	Always
Dark Room	1.76	Never
Electric Fans	4.35	Always
Electricity	4.45	Always
Fire Extinguisher	2.82	Sometimes
First Aid Kit	3.68	Often
Shower Room	2.32	Rarely
Sinks	3.48	Often
Storage Room	3.30	Sometimes
Water Supply	3.91	Often

Laboratory resources such as apparatus, supplies, and facilities have several significant implications for science teachers, especially at the secondary schools. Jofrishal and Munandar (2021) stress how crucial laboratory environments are to efficient instruction and learning. When laboratory resources are readily available, science teachers can implement diverse teaching methods, such as inquiry-based learning and hands-on experiments. This enhances student engagement and understanding of scientific concepts. Availability ensures that teachers can effectively deliver the science curriculum, incorporating practical experiments that reinforce theoretical knowledge. In addition, teachers can better manage their lessons and activities when laboratory resources are easily accessible, allowing for more effective planning and execution of experiments.

Laboratories provide avenues for hands-on learning experiences, allowing students to engage with scientific concepts and techniques firsthand. This active involvement can increase learning and improve retention of complex topics. Well-equipped labs make a greater choice of experiments possible, improving the learning experience. Many students find laboratory activities more engaging than typical classroom education. Experiments' practical components can pique students' interest and make learning more enjoyable, which may increase their interest in science (Gericke et al., 2022).

By encouraging students to pose questions, plan experiments, and test hypotheses, laboratories may support inquiry-based learning and help them develop a deeper comprehension of the scientific method. A lab can be a useful setting for training and can develop research skills such as observation, hypothesis formulation, and testing (Scaradozzi et al., 2021).

Students who intend to pursue higher education in science or similar subjects may benefit from experience with laboratory equipment and procedures. Additionally, it can serve as a basis for professions in mathematics, science, technology, and engineering.

Conclusion

The study investigated the availability and level of utilization of science laboratory resources which includes the apparatus, supplies and facilities based from the Department of Education (DepEd) Guidelines for the Provision of Science and Mathematics Equipment as stipulated from DepEd Order # 17, s. 2017 and DepEd Guidelines for the Prescribed Science Laboratory School Facilities specified from DepEd Order # 42, s. 2006. The study was conducted in the different public secondary schools of Ilocos Norte where 198 Junior and Senior High school science teachers were purposively asked to assess their science laboratories. The study's findings indicated that while basic science laboratory apparatus such as beaker, Erlenmeyer flask, graduated cylinder, and test tube are always available, most schools had significantly insufficient advanced laboratory apparatus, and chemicals. This analysis indicated that the majority of schools lack dedicated dark rooms and shower facilities.

In terms of level of utilization, there is no apparatus that is Always utilized during science laboratory activities, thirteen (13) laboratory apparatus are Often utilized, while forty (40) laboratory apparatus are Sometimes used, sixty-eight (68) laboratory apparatus are Rarely utilized, and twenty (20) laboratory apparatus that are Never utilized. Based on the laboratory supplies and facilities, electricity, electric fan, and cabinets are Always utilized, however, it is notable that dark room is Never utilized.

Overall, most of the public secondary schools in Ilocos Norte have basic science laboratory resources, these resources are often utilized during science laboratory activities. However, it is important to note that many of the advanced apparatus and facilities such as laboratory chemicals and dark rooms are unavailable, and not utilized.

The researchers explicitly recommend for a study that compares student learning and engagement in schools with varying levels of laboratory availability and utilization, specifically investigating the efficacy of alternative teaching approaches in resource-limited settings. Additionally, conducting a nationwide or regional survey of schools and universities to evaluate the accessibility of scientific laboratory resources and correlate this information with student performance indicators. This would offer a thorough analysis of resource inequalities nationwide. A recommended study on analyzing current policies on scientific education funding and resource allocation would targets areas for enhancement and promote equal distribution of resources.

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