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SCIENCE LABORATORY ACTIVITIES IN LOWLAND AND UPLAND SENIOR HIGH SCHOOLS: BASES FOR POLICY RECOMMENDATION

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ABSTRACT

This research study determined the science laboratory activities in lowland and upland Senior High School as bases for policy recommendation. Studies revealed that there were 40 available equipment and apparatuses in lowland while 75 in upland. Science laboratory activities in lowland was taught using thorough supervision, competency-based, classroom-based laboratory activity, and preparation and provision of materials. While in upland, it was taught through multimedia-based instruction, concept integration, comprehensive laboratory activities, and conditional laboratory activities. Related problems encountered in lowland schools were insufficient equipment and apparatuses, and post high risk for learners. On the other hand, upland schools encountered inadequacy of laboratory facility, equipment and apparatuses, time insufficiency, and unorganized area. Science teachers in lowland and upland schools managed the problems encountered by provision of materials, indigenous materials as an alternative,

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capability to calibrate and repair, conducive space, multimedia mediated, risk anticipation and laboratory demonstration.

Keywords: *Science Laboratory Activities, Lowland and Upland Senior High Schools*

INTRODUCTION

The Philippines, as an archipelagic country, has regions spread across mountainous terrains and close to the coast. The areas mentioned are referred to as upland and lowland. The former resembling hilly terrain, is widely used to describe topographical locations. The latter regions, which are both below and beyond mountainous zones are affected by both man-made interconnections and downslope geological processes that link the two different terrains (Fleming, 2020).

Despite its diverse topography, the education system of the country is widely regarded as highly advanced in Asia. This is evident through its commendable rates of basic education completion, higher education participation, and adult literacy, which are comparable to those of more developed economies such as Hong Kong, Singapore, and South Korea (Future Learn, 2021).

The methods used, particularly by senior high school science teachers to teach differ depending on where the schools are located. Teachers never stop innovating teaching strategies

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that can fit the needs of every learner depending on the location especially in science laboratory activities. As claimed by Cullin et al. (2017), laboratory practice plays a central role in bridging the gap between theory and practice. Class teachers are expected to be more proactive in the laboratory environment related subjects. Integration of laboratory activities captures the interest of learners since they experience hands-on learning (Duban et al., 2017).

One of the major obstacles to learning science, according to a study by Kaptan and Timurlenk (2012) quoted by Rogayan Jr. et al. (2020), is a lack of proper laboratory facilities and equipment. According to the Department of Education, there exists a significant deficit of laboratory facilities in elementary and middle schools nationwide. In Regions III, IV-A, X, XI, and XII, a mere 10% of public elementary schools possess a science laboratory. In the National Capital Region area, the laboratory-to-elementary school ratio is 3:10. According to a survey conducted among 173 instructors from different regions in the Philippines, it was observed that a significant proportion of 23% still lack access to laboratories, while only 39% have the privilege of utilizing at least one laboratory exclusively dedicated to a specific scientific discipline (Pingol et al., 2015).

San Joaquin, as a municipality at the southern part of Iloilo, is partially composed of lowland and upland areas. In the district of San Joaquin South, there are six (6) schools offering senior high schools and situated in lowland and upland areas (PhilAtlas, 2023).

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Teachers place a significant emphasis on laboratory activities as a means of facilitating science instruction and enhancing the learning experience. Hence, it is imperative to take into account the experiences and obstacles faced by instructors in determining the appropriate methods for teaching science, particularly in light of the availability of laboratory facilities. As a result, the experiences of individuals have the potential to shape instructional methodologies and the dissemination of curriculum (Suleiman, 2013).

Given the prevailing circumstances that surround the scientific laboratory, the researcher was motivated to undertake the study, which aimed to explore the experiences and challenges faced by science teachers in lowland and upland senior high schools within the district of San Joaquin South. The researcher was interested to investigate the differences in teaching styles as influenced by the presence of laboratory equipment and the geographical location of the school.

MATERIALS AND METHODS

Research Method

The study utilized the qualitative research design using in-depth interviews. Conduct of the interview was face-to-face in the station or area of the participants for their convenience during vacant time while observing non disruption of classes and proper health protocols to gather the data about the science laboratory activities in lowland and upland senior high schools.

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In an in-depth interview, descriptive method was employed to have a detailed information about participants thoughts and behaviors regarding the availability of equipment and apparatuses, teaching style, challenges encountered, and coping mechanisms of senior high school science teachers.

Research Design

The researcher employed a phenomenological approach within the context of qualitative methods. Bazeley (2009), as referenced by Fura and Negash (2020), provided a definition of phenomenology as a scientific discipline that aims to elucidate specific phenomena or the perceptual manifestations of entities, as they are subjectively experienced. According to Neubauer et al. (2019), phenomenology research aims to provide a comprehensive description and understanding of lived experiences. The subjective interpretation of a certain phenomena is imbued with significance by an individual's personal encounters, encompassing both internal and external factors.

Participants of the study

The participants of the study were ten (10) teachers teaching science related subjects in Senior High School in the district of San Joaquin South, Schools Division of Iloilo, Philippines, whom the researcher chose through purposive sampling.

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Six (6) participants were from the following lowland schools: Lawigan National High School, Sinogbuhan National High School, Tiolas National High School; and four (4) participants from upland schools; Escalantera National High School, Pitogo National High School, Valverde National High School.

Sampling Design

Purposive sampling technique was used by the researcher to identify participants who possess the requisite experience and are ready to contribute the data. Purposive sampling is a sampling technique in which researcher relies on his own judgment when choosing members of population to participate in the study (Dudovskiy, 2022).

According to Padgett (2017), purposive sampling entails the intentional selection of particular individuals, events, or situations based on their ability to offer essential information that may not be as effectively collected by alternative means.

Research Instrument

The research instrument used in the study was the researcher-made questionnaire. The instrument has two parts: part I is the checklist to gather back-up information needed to support the data in the interview and part II is an open-ended questions. A panel of experts validated the questionnaire. Comments and suggestions relative to the validation of the tool were considered.

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Face-to-face interview was done among the participants during the vacant time while observing the health protocol and following the "no disruption of classes" policy of the Department of Education. As agreed by the participants, video and audio recorders were used to capture all the proceedings during the in-depth interviews. The responses of the participants were transcribed right after.

Validity of the Research Instrument

The questionnaire created by the researcher went through a process of content validation by the panel of experts for review and modification.

The instrument is composed of a checklist based from Chachaiya et al. (2020) about common laboratory equipment and an open-ended questions.

Adjustment or ideas offered to improved the questionnaire were merged by the researcher in the final draft using the appropriate form of Goods and Skates (Appendix C).

Data Gathering Procedures

The letter of the researcher addressed to the Division Superintendent and Public-School District Supervisor asking permission to conduct the said study was approved. Upon approval of the letter, the researcher presented the letter to the school head and identified the qualified participants.

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Individual interviews were conducted in school affiliated by the participants during vacant time. The researcher observed the health protocols in conducting the face-to-face interview while following the "no disruption of classes" policy of the Department of Education. The participants were asked first to answer the checklist on the available science laboratory equipment and apparatuses. Then, the interview proper followed utilizing three distinct types: open-ended, semi-structured, and structured interviews, all of which revolved around the interview questions.

Using in-depth interview, a video and audio recording were provided to completely capture the interviewees' responses. Approval from the participants to have the video and audio taken during the interview was made prior to actual capture. The researcher transcribed, collated the data, and consolidated for analysis.

Voice recordings were transcribed. The original and translated transcripts were categorized into meaning using thematic approach.

Data Analyses

The collected data were subjected to analysis using a thematic approach. Thematic analysis, also referred to as the thematic approach, is a widely used method for interpreting qualitative data. Typically, this methodology is employed in the analysis of a collection of textual data, such as transcripts from interviews. The researcher conducted a thorough analysis of the data in order to discover recurring themes, including subjects, concepts, and patterns of meaning.

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RESULTS AND DISCUSSION

The study was conducted to determine the science laboratory activities in lowland and upland senior high schools as bases for policy recommendation in the District of San Joaquin South, Iloilo, Philippines.

The study employed the phenomenological research design to describe the science laboratory activities in lowland and upland senior high schools. The design is concerned with actual experiences of everyday life as they are experientially lived, sensed, and acted, and in particular the existential experience of situations.

A researcher-made questionnaire composed of a checklist and an open-ended questions was used to gather data. The tool was subjected to validity test.

The study revealed that, the equipment and apparatuses that are available in lowland schools are 75 and in upland senior high schools are 40 only. This shows that the equipment and apparatuses are insufficient to cater the learning needs of senior high school learners.

The senior high school science teachers in lowland senior high schools teach science laboratory activities by Thorough supervision, competency-based, classroom-based laboratory activity, and preparation and provision of materials while in upland area are multimedia-based instruction, concept integration, comprehensive laboratory activities, and conditional laboratory activities.

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Related problems were relevantly encountered in lowland schools, such as insufficient equipment and apparatuses and post high risk for learners, while in upland schools were inadequacy of laboratory facility, equipment and apparatuses, time insufficiency, and unorganized area.

The senior high school science teachers manage the challenges encountered by provision of materials, using indigenous materials as alternative, capability to calibrate and repair, conducive learning space, multimedia mediation, risk anticipation, and laboratory demonstration.

The implementation of science laboratory activities in lowland and upland senior high schools in the district of San Joaquin South was greatly affected by the presence of equipment and apparatuses and geographical location.

The objective of science education curriculum is to let the learners experience hands-on activity to promote effective learning decelerated because of the current situation of the science laboratory activities in provincial lowland and upland schools.

With the presence of the laboratory equipment and apparatuses, it is still not enough to serve the needs of senior high school learners towards science laboratory activities. It is necessary to realize that laboratory work is irreplaceable important in teaching senior high school science subjects.

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In teaching science laboratory activities, it is more appropriate to based the lesson in the most essential learning competency. While senior high school teachers were enthusiastic and creative in teaching, hindering factors limit their capability to perform well. Teachers have at least performed the laboratory but not in a proper laboratory setting. The access to proper equipment and apparatuses were minimal that resulted to use alternative materials. Science teachers would even exert a lot of effort to exercise the desired laboratory activity by finding the materials mostly at their own expense. This sometimes lead the teachers to other cheap means which is to use downloaded video lessons leaving the learners having no chance to experience the laboratory activity.

Laboratory activities mostly performed inside the classroom or any available area exposed the learners in a risky environment which add up to teachers obligation to secure not only the laboratory equipment but also the safety of the learners.

As science teacher who teaches in rural lowland and upland area, in a small to medium school category, they should be creative, resourceful, and at the same time practical in the conduct of science laboratory activities.

From the study, it showed that even though there is no separate laboratory for each science class and the existing laboratory is not well equipped and suitable for the conduct of

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activities, science teachers still finds and exert efforts just to bring quality science education to learners.

Use of alternatives for the lacked of equipment and apparatuses to supplement the shortage of materials were considered. There were a lot of available materials found in the locality as the only choice in order to make the conduct of laboratory activity possible, since it yields the same result just like the recommended one.

CONCLUSIONS

In the light of the findings and insights arrived at in this study, the following recommendations were forwarded:

There was a policy recommendation suggested namely: capacitate the teachers to indigenous alternatives for laboratory materials for lowland, and prioritize the addition and provision of laboratory equipment and apparatuses for upland senior high school science teachers. The purpose of the created policies was to solve the problem faced by science teachers in high schools located in lowland and upland areas. With these policies, senior high school science teachers will be equipped with essential materials and ideas for whatever set of senior high school learners they will handle. Allocation of budget will be coming from school's Maintenance and Other Operating Expenses (MOOE) and external stakeholders. Also, equipment

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and apparatuses intended for Senior high school learners as the center of learning must be provided with necessary learning materials.

School heads should include the establishment of functioning and well-equipped scientific laboratories, equipment and instruments as a top priority in the School Improvement Plan (SIP), from the Maintenance and Other Operating Expenses (MOOE) must be allocated funds.

Senior high school teachers teaching science-related subjects should make this policy as a basis to prepare lesson and implement science laboratory activities that will suit to the needs of senior high school learners. Also, senior high school teachers should design, improve, and sustain the quality of science-related subjects quality of teaching.

Senior high school learners should be encouraged to participate in class especially in laboratory activities. With participation, they are also expected to cooperate with the provision of materials as well as keep the equipment and apparatuses in good condition.

Parents of senior high school learners should monitor the needs of their child and actively support the schools' upcoming activities to ensure that their children learn more.

Local Government Unit may offer assistance to schools without a functional laboratory facility. They can also help in providing instructional materials in the science laboratory to support the school.

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Another research study is encouraged to be conducted and in other district offices to find out the science laboratory activities in lowland and upland senior high schools.

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