



**EXPERIENCES OF TEACHERS ON THE USE OF TECHNOLOGY
IN TEACHING SCIENCE IN LOWLAND AND UPLAND HIGH
SCHOOLS AS BASIS FOR POLICY RECOMMENDATION**

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ABSTRACT

This descriptive-qualitative study determined the experiences of teachers on the use of technology in teaching science in lowland and upland high schools. It was found out that almost the same technologies were used by teachers in upland and lowland schools. It was also found out that in lowland areas teachers experienced enjoyment and increased participation of students, instructional support, and paperless outputs, while in upland areas, they experienced enjoyment and active participation, simplifies and improves instruction, and technology as visual aids.

Teachers in lowland areas were challenged with poor internet connection, power interruption, spending private funds, and time constraints and expertise, while in upland they identified no/poor internet connection, power outages, time constraints, and malfunction of the devices, lack of training for teachers and students and availability of technology devices. These technologies were useful because they enhanced students' engagement and performance, interactive and fun, made learning accessible and flexible and reduces teacher's time and effort.

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Keywords: *Teachers use of Technology, Science, Lowland and Upland High Schools*

INTRODUCTION

Education relies heavily on technology, which needs to be adapted to meet Department of Education standards, including developing 21st century curricula. Given the rapid pace at which digital technologies are changing the world, their importance to education cannot be overstated (Mishra, Koehler, Henriksen, 2011).

Furthermore, integrating technology into science can encourage students to formulate scientific hypotheses according Hennessy et al. (2007). Technology can help students explore and develop their hypothetical scientific skills (Clarín and Baluyos, 2021). To facilitate the accumulation, connection, and gradual application of knowledge, teachers also thoughtfully and intelligently combined technology with other practical activities (Hennessy et al., 2007).

Science teachers are more accessible when using technology, allowing them to teach more effectively.

Efe (2011) stated that the importance of new technologies in science cannot be ignored because their use can contribute to the development of science teachers by streamlining and improving work production, supporting the co-development of knowledge, supporting research and experiments, and gives students greater responsibility and control through individual research and experimentation, developing inspiration and commitment.

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In the Philippines, teachers and students use technology in the classroom, but some schools are located in geographical areas such as upland and lowland areas, where some allow or prohibit teachers and students from accessing technology based on its availability. Therefore, there are differences in the way technology is used for science education in upland and lowland areas, which may affect the quality of learning and student outcomes.

Thus, in light of these observations, the researcher pursued to determine how high school science teachers in the uplands and lowlands areas have utilized technology to teach science.

MATERIALS AND METHODS

Research Methodology

This chapter describes the study's research methodology, research design, participants, data collection procedures, research instrument, and data analysis. In order to formulate policy recommendations for the secondary Schools of San Joaquin, Iloilo for the 2022-2023 school year, the purpose of this study is to ascertain the experiences of instructors regarding the use of technology in teaching science in lowland and upland high schools.

Research Method

The research method used in the study was descriptive research method using in-depth interview to gather data about teacher's experiences on the use of technology in teaching science in lowland and upland high schools (Jamshed, 2014).

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Conduct of the interview was face-to-face in the station or place convenient for the participants during their free time observing the no-disruption-of-classes policy as stipulated in the DepEd Order No. 09 s. 2005 and proper health protocols to gather data. Through the responses of the participants, it was hoped to ascertain their essential perspectives regarding a particular issue in a social context.



Research Design

The study employed descriptive-qualitative research design using phenomenology.

Phenomenology is a philosophical methodology for conducting qualitative investigation. By concentrating on an individual's subjective interpretations of her experiences, phenomenology seeks to comprehend how others view the world and how this view may differ from commonly held views. Phenomenology is frequently used in disciplines such as psychology, sociology, and social work, and is conducted by interviewing subjects to learn their perspectives.

Phenomenology is the study of the subjective structures of consciousness, according to Smith (2013). As an experience is of or about an object, its central structure is its intentionality, or the fact that it is directed toward something. Experience is directed toward an object by virtue of its content or meaning (which represents the object) and facilitating conditions.

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Participants of the Study

The participants of the study were twenty (20) selected Science teachers teaching science subjects in Junior and Senior High Schools in the municipality of San Joaquin, San Joaquin, Iloilo for school year 2022-2023.

Five (5) participants were taken from the following lowland schools: Don Felix Serra National High School, Tiolas National High School, San Joaquin School of Fisheries, Lawigan National High School, Sinogbuan National High School; and six (6) from the following upland high schools: Bad-as National High School, Pitogo National High School, Ginot-an National High School, Escalantera National High School, Valverde national High School, Sta. Ana National High School.

Sampling Design

The study employed a purposeful sampling design. A purposive sample is a non-probability sample selected based on the characteristics of the population and the objective of the study. Sampling on purpose is also known as subjective, subjective sampling, and judgmental sampling (Creswell, 2014).

Research Instrument

The study's research instrument was a researcher-created interview schedule.

The interview schedule includes three queries pertaining to the objective of the study.

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Voice and video recorders were utilized, with participant permission, for data collection and documentation.

Validity of the Research Instrument

Prior to the researcher, the adviser, and the dean of the graduate school determining the validity of the interview schedule, a panel of jurors with expertise in the disciplines of research, testing and assessment, and English reviewed and modified each question.

Validity refers to the appropriateness, significance, precision, and usefulness of a researcher's inferences. This is beneficial for validating questionnaire items (Fraenkel & Wallen, 2007).

Employing the correct form of Good and Scates (Appendix A), we considered the council of validators' comments, corrections, and suggestions regarding the interview schedule.

Data Gathering Procedures

The adviser, dean of the graduate school, office of the schools' division superintendent, office of the district administrators, school principals, and individual participants granted permission for the study. The researcher traveled to the participants' schools/communities/preferred locations to conduct the interviews.

The researcher conducted an interview to the participants but prior to this, the researcher encouraged them to sign a waiver or permission relative to the conduct of the study. During the conduct of the study, minimum health protocols mandated by the Inter Agency Task Force (IATF),

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Department of Health (DOH) guidelines during the pandemic, DepEd Orders on the Health protocols, Local Government Units, and barangay health protocols were adhered to and strictly observed.

Using in-depth interviews, voice and video recorders were provided to completely capture the interviewee's words. Following a succession of participant interviews, the researcher compiled all data gathered.

Data Analysis

The obtained data were subjected to a thematic analysis.

The process of identifying themes or patterns in qualitative data is called thematic analysis. The purpose of a thematic analysis, according to Maguire and Delahunt (2017), is to identify significant or intriguing themes, such as patterns in the data, and use these themes to address the research or remark on an issue. This involves summarizing, analyzing, and making meaning of the collected data.

RESULTS AND DISCUSSIONS

Summary

The purpose of the study was to ascertain the experiences of teachers regarding the use of technology in teaching science in lowland and upland high schools as a basis for policy recommendations in the secondary schools of San Joaquin, Iloilo during the 2022-2023 school year.

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This study employed a qualitative method comprising in-depth interviews and a phenomenology research design.

Twenty science teachers designated to secondary schools in San Joaquin, Iloilo's lowland and upland areas for the 2022-2023 school year participated in the study.

The study's research instrument was an interview schedule developed by the researchers. Voice and video recorders were also used for data collection and documentation, with participant permission.

A panel of experts validated the interview schedule and considered all pertinent comments and suggestions.

Each participant granted permission for the researcher to conduct the study. The interview was conducted at the participant's schools/community/preferred location, and virtual instruction was completed prior to the interview.

During the course of the study, minimum health protocols mandated by the Inter Agency Task Force (IATF), Department of Health (DOH) guidelines during the pandemic, DepEd Orders on the Health protocols, Local Government Units and Barangay health protocols were strictly observed and adhered to.

Voice and video recorders were used to document the entirety of the interviewee's words and responses using in-depth interviews. After conducting a series of interviews, the researcher compiled the collected data. The collated data was subjected to a thematic analysis.

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The following are the findings of the study:

Based on the results of the in-depth interview with teachers teaching science in lowland areas, they use electronic technologies such as computer/laptop, television, cellular phone, projector, tablets, netbook, speaker, microphone, printer, electronic microscope, word processors like Microsoft Word, Excel, powerpoint presentation, publisher, online communication through internet/Wi-Fi, email, google meet, online games such as KAHOOT and QUIZES, cloud storage like google drive and multimedia through video clips and CANVA.

The following are the technology used in teaching Science: word processors such as Microsoft Word, Excel, Powerpoint presentation and publisher, electronic technologies such as television, laptop/tablets, projector and cellphones, online communication through internet connection and multimedia to download presentation, videos and pictures.

In using these technologies, teachers in lowland areas experienced increase in learners' participation, high instructional support, and generate paperless outputs.

Teachers in upland areas, experienced enjoyment and active learners' participation; that use of technology enhanced and simplified instruction, and that it served as visual aid as well.

However, teachers in both lowland and upland areas who taught science encountered challenges that include inadequate internet connection, power outages, spending personal funds, time constraints, and lack of expertise in using the technology.

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According to teachers in upland areas, the obstacles they encountered in teaching science include no/poor internet connection, power interruptions/blackouts, time constraints, malfunctioning devices, lack of training for teachers and students, and lack of available of technology devices.

Teachers in lowland areas, found the technologies useful in teaching science because they increase student participation and performance, are interactive and enjoyable, make learning accessible and flexible, and aid teachers as facilitators of learning.

Teachers in upland areas consider technologies beneficial in teaching science because they reduce teachers' time and effort, make learning simple and interactive, and motivates the students.

Insights

Based on the findings, the following insights were drawn:

Both lowland and upland high school science teachers are using available technological devices and mostly free online/offline applications to deliver and facilitate instruction, but since its availability is limited, Technology has yet to reach high schools in both lowland and upland high schools for science teachers and learners to access and use technological devices and online/offline applications. With the availability of technological devices and applications, teachers must be creative and innovative when it comes to engaging students. They must do everything in their power to actually teach their students new things

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and to ensure that the teaching style and methods of teaching and learning utilize both the traditional methods and modern approach in teaching.

Teachers need to be supported with technology concerns such as internet connectivity, available technological devices, teachers and learner's expertise on the use of technology and power outages as these are common challenges for science teachers, especially in upland areas.

This is to ensure that students in secondary schools in upland areas do not fall behind students in secondary schools in lowland areas.

RECOMMENDATIONS

In light of the findings and insights obtained from this study, the following recommendations are made:

Teachers and students should have access to a stable internet connection and complimentary wifi in order to conduct lesson-related research and utilize online applications.

The school is encouraged to implement a solar panel or generator-powered power supply to minimize power outages and supply electricity.

The school should have functional technology devices such as computers, laptops/tablets, televisions, projectors, speakers, microphones, printers, and Wi-Fi that are accessible to all instructors.

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ISSN: 2704-3010

Volume V, Issue III

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Available online at <https://www.instabrightgazette.com>



To maximize the use of computers and technology in the classroom and the teaching-learning process, teachers and other school personnel must undergo a rigorous training-workshop. DepEd authorities should pay close attention to the availability and upgrade of ICT equipment for use by instructors in schools. For the teaching-learning process to be effective and fruitful, it must be conducted in an interactive and collaborative manner through the use of technology.

The Schools Division Office, Regional Office, and Central Office each should receive a copy of the remediation and enrichment programs for approval and implementation.

If a copy of these recommended remediation and enrichment programs is not approved, school administrators are encouraged to implement them on a local basis.

In the future, it is recommended that a similar study be conducted and that it considers variables that were neither used nor mentioned in the current study.

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