



AMERICAN JOURNAL OF EDUCATION AND TECHNOLOGY (AJET)

ISSN: 2832-9481 (ONLINE)

VOLUME 1 ISSUE 2 (2022)



Indexed in



PUBLISHED BY: E-PALLI, DELAWARE, USA

Home-Based Learning Interventions of Science Teachers in the Absence of Laboratory Experiments

Liza S. Gapasin¹, Janice B. Manongsong¹, Ali E. Tukuran¹, Lean Cornette S. Rodriguez¹, Jovie C. Alquizar¹,
Nasrudin S. Manial¹, Zairin A. Amba¹, Jolai G. Bolaños^{1*}, Honeylyn M. Mahinay¹

Article Information

Received: September 14, 2022

Accepted: September 19, 2022

Published: September 24, 2022

Keywords

*Home-Based Experimentation,
Learning Interventions,
Laboratory Experiment,
Interventions, Laboratory*

ABSTRACT

The research aimed to determine the learning interventions of science teachers in the absence of laboratory experiments during pandemic which is vital to teachers and learners. A semi-structured in-depth clinical interview was performed which involved direct questioning using open-ended and/or probing questions and the observations of the Science teachers regarding their learning. It was conducted at Notre Dame of Midsayap College to Science teachers that was currently teaching in this institution. In gathering data, researchers used convenience sampling method based on the participants' availability and their in-depth interview responses were collected from six science teachers. Findings revealed that science teachers used home-based experimentations as learning interventions. Science teachers find it more convenient to have home-based experimentation because the materials are easy to find in their homes. However, internet connection and availability of the materials are most common problem as the teachers did the home-based experiment. Therefore the researchers concluded that the participants of this study used home-based experiment in teaching science during in the absence of laboratory activities. It significantly impacts to the teachers as their interventions to provide quality education to the learners.

INTRODUCTION

The pandemic brought an accelerated change to the curriculum content delivery methods (Tongco *et al.*, 2020). Covid-19 pandemic affected the educational system specifically in the field of science courses. Traditional learning change due to the current issues, it was transformed as the distance learning. This new way of learning brought by pandemic emphasized that teachers have a big role to be an effective educator.

Conversely, science teachers encountered difficulties in teaching science subjects, especially in online learning class, because of the laboratory experimentation activity. This limits the capacity of teachers to guide students learning through experimentation and hands-on activities (Pingol *et al.*, 2015). Science is best taught by experimental learning through the use of hands-on activities (Tongco *et al.*, 2020). The best way in teaching science subjects was taught by experimental learning through the use of hands-on activities. The absence of laboratory experimentation can brought negative impact to both teachers and students.

In 2020, the Covid-19 became an international problem, in which an at home laboratory program was developed and implemented for a section of general chemistry course at the University of Southern California. The experiment was designed to only utilize safe household items and no special equipment. These laboratory activities spanning 4 weeks, focused on concepts usually covered in the final one third of the second-semester chemistry laboratory, including pH, acid base titrations, buffer, solubility, phase equilibria, and thermodynamics (Andrews *et al.*, 2020).

In the Philippines, to respond the absence of laboratory

experiments during pandemic, De La Salle University, has turn to incorporate the remote learning. However, became a challenge for STEM-related disciplines, particularly laboratory course work. In the midst of a pandemic, simulations and movies have been used to supplement actual laboratory work and provide high-quality learning (Pacifico & Prudente 2021).

In line with this, the researchers studied and identified the interventions, of the teachers that they used to alleviate the absence of laboratory experiments. By this intervention, it can served as a tool to every science teacher as an additional strategy in their online classes specifically in the field of science subject.

Statement of the Problem

This study focused on the learning interventions of science teachers of Notre Dame of Midsayap College, in dealing the absence of Laboratory experiments.

Specifically, it aimed to answer the following questions:

1. What are the learning interventions of science teachers in dealing with the absence of laboratory experiments?
2. How did the teachers apply these learning interventions in their classes?
3. What are the problems that the teachers encountered in applying these learning interventions?

Delimitation and Limitation of the Study

In this study, the researchers determined the learning interventions of science teachers in the absence of laboratory experiments by surveying six (6) science teachers as the participants. The study was limited only among the Science teachers in Notre Dame of Midsayap College.

¹ Notre Dame of Midsayap College Midsayap, North Cotabato, Philippines

* Corresponding author's e-mail: jolaigarcia30@gmail.com

METHODOLOGY

The qualitative method was designed in conducting the study. Qualitative research designed involves any research that uses data that do not indicate ordinal values (Ryan *et al.* 2001). It sought to interview the science teachers on what are their learning interventions in the absence of laboratory experiment.

Research Environment

The study was conducted through individual interviews. Interviews was conducted in a closed room for the researchers to gathered clearer and accurate data.

Sampling Design

The researchers used Convenience Sampling method to gather samples by taking samples that are conveniently located around the area of the study. The sample of the population used reflects those who were available, agreed to participate and had access to at the moment in time to be part of the study. Thus, the researchers conducted the study using the said sampling method by gathering their opinions regarding the study.

Research Locale and Respondents

The research was conducted in Notre Dame of Midsayap College, Poblacion 5, Midsayap, Cotabato. This was conducted during the second semester of the school year 2021-2022. The participants were six (6) College teachers of Notre Dame of Midsayap College.

Research Instrument

The researcher used semi-structured in-depth clinical interview questionnaire, which involved both direct questioning using open-ended and or probing questions and also the observations of the Science teachers with regards to their learning interventions.

The researchers used different sources of data and data gathering instruments which are categorized into two Groups.

Primary Data

The primary data was gathered through the interview which were conducted individually per participant,

Secondary Data

Secondary data was taken from other sources such as previous studies and researches.

Data Sources

Qualitative researchers collected data from the participants which are the science teachers. This study was conducted through In-depth interviews with individual participants.

Data Gathering Procedure

The researchers observed the school protocols before gathering data. The researchers prepared a letter for the Dean of College of Education informing about the research study and prepared a survey questionnaire and

have it validated wherein it will be our guide in conducting an interview to the participants. The researchers prepared and administered an informed consent to the respondents to inform them ahead of time and schedule their interview on their most convenient time. And participants were interviewed individually.

Trustworthiness of the Study

To establish the trustworthiness of the study, the researchers observed its four components. These are following: Credibility, Transferability, Dependability and Conformability.

Credibility

To establish the credibility of our study, the researchers ensured the rigor will be properly observed during the data collection especially during the interviews, wherein the researchers avoided drawing conclusions from the interviews but based everything on factual data, directly from the participants. The researchers made sure that no relevant data was excluded and no irrelevant data was included.

Transferability

To address transferability, the researchers described in detail the research context and the assumptions that are central to the research and show all data as transparent as possible. The researchers made sure that the data are rich with descriptions, so that the person who wishes to “transfer” the results to a different context is then responsible for making the judgements of how sensible the transfer is.

Dependability: To establish the dependability of our study, the researchers ensured consistency during the data collection and analysis by doing the code-recode system during data reduction and applied the squint examination of the data collected and analyzed. This made the study reliable.

Conformability

To address the conformability of our study, the researchers set aside their personal opinions, assumptions and judgements in order to guard against distortion of data. The use of audio-taped interview, note-taking and journals was kept throughout the study was one way of ensuring conformability.

Ethical Consideration

In pursuant to Republic Act No. 10173, otherwise known as the Data Privacy Act which seeks to protect all forms of information, be it private, personal, or sensitive. It is meant to cover both natural and juridical persons involved in the processing of personal information. In line with this, all information gathered through this study remained confidential at all times.

RESULTS

The qualitative case study was analyzed by the respondents

of the following research questions: (1) What are the learning interventions of science teachers in dealing with the absence of laboratory experiments? (2) How did the teachers apply these learning interventions in their classes? And (3) What are the teachers' problems in applying these learning interventions? Considering that not all science teachers in Notre Dame of Midsayap College are available to be our respondents, the researchers only gathered data from those science teachers whom are available and agreed to be interviewed as our responders.

An in-depth interview was used to gather data to understand the essence of science teachers' learning interventions in the absence of laboratory experiments during the pandemic.

Categorization of Emergent Themes

After an in-depth interview and each response of the participants was transcribed and translated. Considering that not all challenges experienced by the Science teachers

can be described in a positive way, the study based on the responses and shared experiences of the participants. The fundamental goal of the approach was arrived at a description of the nature of the particular phenomenon. In connection with this, to categorize the information, the themes were presented according to the order of the research questions; (1) What are the learning interventions of science teachers in dealing with the absence of laboratory experiments? (2) How did the teachers apply these learning interventions in their classes? And (3) What are the problems that the teachers encountered in applying these learning interventions?

Findings

Based on the face-to-face in-depth interview of the participants, three significant themes have been found, each with underlying sub-themes were drawn from the analysis as seen in Table 1. The themes emerged are the following: (a) Learning Interventions (b) Application

Table 1: The major themes emerged for the identified learning interventions of Science teacher in the absence of laboratory experiments.

Major Themes	Sub-themes
A. Learning Interventions	i. Reason for choosing the intervention ii. Formulation of chosen interventions
B. Application of Learning Interventions	i. Efficiency of the chosen intervention ii. Frequency of usage of the chosen interventions
C. Problems during application	i. Overcoming the problem ii. Further use of the intervention

of Learning Interventions and (c) Problem during Applications.

Learning Interventions

Participants have mostly chosen to conduct home based experiments as their learning intervention to bridge the gap in learning with the absence of laboratory experiments caused by the pandemic as the participants had stated. While other participants only used videos to supplement the absence of laboratory experiments.

Reasons for Choosing the Intervention

The participants had considered the well-being of the student with regards to the quality of learning in applying these interventions. And one of the participants chose the intervention based on experience.

Formulation of Chosen Intervention

They came up with these interventions based of their experiences, practices in other school and through research with some modifications to fit the need of the students. During the application of these interventions, the participants made use of online learning platforms wherein they had uploaded demo videos and instructions for the experiments.

Application of Learning Interventions

Participants used an online learning app to post demo videos and instructions for their home based experiments.

Efficiency of the Chosen Intervention

The participants had given assessments in line with the home-based experiments and also they have tasked the students to submit video outputs which in turn helped them assess the efficiency of the interventions.

Frequency of Usage of the Chosen Intervention

Two of the participants based the usage of their learning interventions on the performance of the students and the availability of resources.

Problems During Application

The participants had problems correcting the procedures the students did, wherein those mistakes would urge the participants to extend the deadline of the activity.

Overcoming the Problems

In relation to the problems encountered throughout these learning interventions, the participants came up with ways to solve this problem.

Further Use of the Intervention

The participants had shown willingness to continue using the said interventions based on the good outcomes but with enhancements.

DISCUSSION

Findings revealed that science teachers had chosen

home-based experiments as the learning interventions without face-to-face laboratory activities. This learning intervention served as a strategy of teachers to provide quality learning. Additionally, the participants mainly chose to conduct home-based experiments to bridge the gap in learning in the absence of laboratory experiments caused by the pandemic. Science teachers applied Schoology as the platform in delivering asynchronous classes in which instructions and directions are posted to the said platform. In line with the learning interventions was the effectivity, wherein the science teachers stated that their interventions are effective because the students was able to produced precise product and present correct output. And in every uploaded material there was follow up assessment. Participant's responses also stated the difficulties they've encountered such as guiding the students during the experimentation, replacing the materials that was needed in the experiment and unstable internet connection. However, teacher allowed their students took pictures of their works as concrete evidence of doing the activity.

RECOMMENDATIONS

Based on the findings of the study, the researchers offered recommendations in four areas which are Policy Recommendations for Administrators, Problem Discovered Recommendations for the Science Teachers and Future Researchers Recommendations. First, under the policy recommendation for administrators, the researchers recommended to encourage the science teachers to design programs to enhance the Home-Based learning interventions, encourage the teachers to craft laboratory manuals, offer teacher's training for Home-Based experiments and reinforce the Home-Based experiment programs. Secondly, the problem discovered recommendations for the science teachers, the researchers offered to the science teachers to provide a remedial class for students who are not able to perform the home-based experiments due to some technical problems such as poor internet connections, absence of laboratory materials that are needed. Lastly,

the recommendations for future researchers are to study more about the learning interventions of teachers in the absence of laboratory and to undergo further research about learning interventions of science teachers during pandemic that can improve the student's performance.

CONCLUSION

Based on the statements the participants gave, the researchers have concluded that home-based interventions were used mainly by the participants in the absence of face-to-face laboratory experiments. The participants have chosen this intervention based on the well-being of the students and the availability of materials. In addition, the participants also stated that these interventions were formulated from other activities online with some modifications. The participants also stated that during its application, the internet connection played a significant role in the efficiency of its conduct. The use of home-based interventions are advised given that resources are available with the inclusion of a good internet connection.

REFERENCES

- Andrews *et al.* (2020). Experimenting with at-home general chemistry laboratories during the COVID-19 pandemic
- Pacific, E., & Prudente, M. (2021). Grade 12 STEM students' perceptions and experiences in h o m e - grown chemistry experiments
- Pingol *et al.* (2015). A survey of high school science teachers' access to modern teaching tools and laboratory.
- Ryan, G. Nkwi, P., & Nyamongo, I., (2001). Field research into socio-cultural issues: Methodological guidelines. Yaounde, Cameroon, Africa: International Center for Applied Social Sciences, Research, and Training/ UNFPA.
- Tongco et.al (2021). Development of virtual laboratory simulations: e-SCILAB on waves for Grade 7 Science. Retrieved <https://ijmaberjournal.org/index.php/ijmaber/article/view/232>