GSJ: Volume 12, Issue 3, March 2024, Online: ISSN 2320-9186
www.globalscientificjournal.com

CHALLENGES AND OPPORTUNITIES IN SCIENCE EDUCATION: A PHENOMENOLOGICAL INVESTIGATION OF SCIENCE TEACHERS' LIVED EXPERIENCES IN THE INDIGENOUS PEOPLES EDUCATION PROGRAM

Jeson Temboy Pawaon
[1]Department of Education/Boston National High School/Poblacion, Boston, Davao Oriental, Philippines

[*]Corresponding Author email: jeson.pawaon@deped.gov.

Abstract.
This study explored the lived experiences of teachers handling science subjects in the IPEd program in the IP schools of Caatijan Elementary School and Caatijan National High School, Boston District, Schools Division of Davao Oriental. It utilized a qualitative research approach and applied a phenomenological design to describe and examine the challenges and opportunities faced by science teachers assigned in the two IPEd schools. There were four teachers who consented to participate in the research and involved in the in-depth interview. In order for the results to be validated, one school head, one learner, and a parent were purposively chosen and interviewed. The main instrument used in the study is the interview schedule and guide questions prepared by the researcher and were subjected to pilot testing to establish its validity and reliability. Guide questions were focused on the teachers' lived experiences in terms of delivering science lessons, issues or challenges in teaching science in IPEd as well as their triumphs. The data from interviews were analyzed through thematic analysis. The findings of the study revealed that the IPEd program faced problems concerning science education. A significant result of the study revealed that science teachers teach contextually within the learners' culture and lacks adequate learning materials and laboratory in instruction to support learning of the IP learners. These findings clearly showed that support from DepEd and Tribal Council is needed to teach science in the IPEd program effectively.

Keywords: indigenous education; indigenous people; science education

1.0 Introduction

Science education aims to develop citizens with scientific literacy, including refining process skills, inquisitiveness, and scientific knowledge that one may use in daily life. It also refers to all branches of science taught at different levels in schools, including science subjects at the universities (Canlas & Karpuwedan, 2020).

The goal of science education in the Philippines is to produce scientifically literate citizens who are informed and active members of the society. They will be able to use and apply scientific knowledge that will positively influence the society they belong (Pacquing, 2018). Moreover, in teaching and learning science within a cultural community, it involves indigenous knowledge which is chiefly rooted from two broad conceptualizations of cultural diversity, one is focused on culturally diverse students and the second is the multicultural approach to science education that uses both Western and Non – Western Science (Carter, 2017; Hauser, Howlett, & Matthews, 2009).

In this view, the Indigenous Peoples Education program of Department of Education was implemented to pave the way for Indigenous People (IP) to access quality education by anchoring it to their cultural roots especially in the teaching of science. The implementation of this curriculum lies in the teachers as they are the ones who have the primary role in contextualizing the lessons to the IP community (Villenes, 2018). As a call for general access to education, the national IP education framework was pursued further to promote the integration of indigenous knowledge to address the needs of the IP learners (Bang & Medin, 2010; Cornelio and de Castro,

2016). Nevertheless, teachers should have a wider understanding of the culture of the Manobo community as localization of curriculum as part of its response to inclusive education.

Additionally, through equal access to education required by Indigenous Peoples' Rights Act of 1997 and the IPEd program, IP learners will be provided with education suitable to their cultural identity in the manner of teaching and learning (Victor & Yano, 2015). It is always important that in the processes of science, contextualization should be practiced. As the existing curricula in science focuses on the knowledge content, it is always important to deliver process of science. As the learners develop positive attitude towards science process, they will be able to make upright judgment, surmount above prejudice and ignorance in the place they live in (Kwok, 2018).

However, science education in the Philippines is faced with challenges. The low achievement of Filipino learners in science is due to several factors concerning their performance, such as the way the teacher teaches, the process of instruction, the curriculum, learning materials, and support from the school administration (Department of Science and Technology & University of the Philippines-National Institute for Science and Mathematics Education Development, 2011). With all of these factors affecting science education, learner's achievement in science will be significantly affected.

Moreover, in the comparative study conducted by Peniero & Toshihiko (2020), it showed that both the Philippines and Japan create lesson plans through localization and contextualization. It is further asserted that the Philippines lacks the facilities in the teaching of science compared to Japan. On the other hand, Pingol, Roxas-Villanueva, & Tapang (2015) supported that Philippines lacks laboratory facilities and equipment. With the absence of laboratories and important materials in teaching science, science teachers are challenged to support learning of the learners in doing tasks in science experiments especially the IP learners. The inadequacy of science materials during hands-on activities hinders their ability to understand theories and concepts.

Moreover, the inadequacy of these learning resources in the teaching and learning process affects the delivery of instruction in all schools (Soetan et al., 2020) and has resulted in poor performance of the students (Ngema, 2016). Furthermore, Rogayan, (2019) asserted that schools should provide science resources such as laboratory facilities, and laboratory apparatuses to improve the quality of science education.

Language is also one of the factors in the IPEd program that affects the learning of the IP learners because of the difficulty to understand science terms which are universally written in English. Moreover, Gudula (2017) explained that language is a barrier in teaching because science teachers have to change from one language to another to translate the words to the learners' mother tongue to let them understand well the lesson and the concept. Cyparsade, Auckloo, Belath, & Hurreeram (2013) on the other hand, suggested that teachers should train themselves in learning the language of their learners to cope up with the barrier. Therefore, science teachers in the IPEd program should learn the language of the indigenous community to address the needs of the IP learners in learning.

Consequently, the support from the Tribal Council and DepEd is needed to effectively teach science in the IPEd program. Kharisma & Pirmana (2013) explained that the government plays a big role particularly in allocating funds for essential resources in education. Moreover, Alabastro (2007) asserted that the support from the government will enable the school to address the challenges encountered by science teachers. Hence, the support from the Tribal Council as an immediate government of the Manobo Tribe and DepEd will let science education effective and relevant in the IPEd program if the facilities and equipment in science are purchased and provided to IPEd schools.

Lastly, this study has looked into the lived experiences of science teachers assigned in selected IPEd schools in Boston, Davao Oriental.

2.0 Methodology

2.1 Research Design

This research study was phenomenology in approach and design. According to Creswell (2014), a phenomenology research design encourages investigating of the lived experiences in a phenomenon defined by the participants. This study was founded on the certainty that the lived experiences of the participants in science education within the IPEd program may have a bearing in improving the quality of science in the delivery of the teaching and learning process through accessible and available learning facilities and resources. The qualitative research design is appropriate for this study as it employed phenomenology to identify actual experiences within a small number of participants (Grundmeyer, 2012). This qualitative research allowed the researcher to design the research framework by being creative in literary-style writing (Creswell, 2014). In addition, the

conduct of this qualitative research unveiled the participants' views which were recorded, transcribed and analyzed to tell a story from the experiences being investigated (Bolderston, 2012). Moreover, through the use of this approach, I have a clearer understanding of the experiences of the participants in science education within the context of the IPEd program and accordingly learned from these experiences.

2.2 Research Locale

The study was carried out in the IP school of Caatijan National High School and Caatijan Elementary School in Caatihan , Boston, Davao Oriental.

2.3 Research Participants

As this research was conducted in the IP community, the participants chosen were IPs and non-IPs of Barangay Caatihan, Boston, Davao Oriental. The study participants were selected using purposive sampling as it engages strategic choice of the sample in the context of the objectives of this study (Palys, 2008). The purposive sampling technique was the thoughtful choice in the conduct of the study as it is non-random and sets out to look for individuals who are willing to give data by their experiences (Tongco, 2007).The researcher chose the participants in this research study because they are the immediate informants of the implementation of the IPEd program in the IP school of Caatijan National High School and Caatijan Elementary School. The participants of this research were two permanent Junior High School science teachers of Caatijan National High School and two permanent Elementary teachers handling science subjects. The participants' perceptions and insights which emerged from the information were gathered through in-depth interview. However, in this study the participants' information and answers to interview questions were kept confidential and used solely for the purpose of this research to secure integrity of a qualitative study.

2.4 Research Instrument

This study used an interview guide question validated by experts.

2.5 Data Gathering Procedure

In this study, a recorder from a cellular phone was used to record the interview process, and all the interviews were transcribed verbatim. Before the interview, the interview guide questions were submitted to experts for validation. After the validation of questions, a pilot testing of the interview guide was employed in Owabangon Elementary School, an IPEd implementing school situated at Sitio Owabangon, Barangay San Jose, Boston, Davao Oriental. Moreover, the researcher distributed informed consent to the participants prior to the conduct of the interview using an interview guide which contained the interview questions. In the initial step of the interview process, the participants were oriented on the purpose of the study, their right to withdraw from the study and the protection of confidentiality.

In the conduct of this study, the participants of this research study were contacted through a letter containing details of the research. The participants have chosen where to conduct the interviews in their most comfortable time where they can freely express their ideas on the research topic. Moreover, the interview guide was used in the qualitative research by gathering primary data from the participants' perceptions, thoughts, and ideas (Bolderston, 2012). The method of interview used in this study was carried out in an audio-recorded face-to-face interview.

2.6 Ethical Considerations

The consideration of ethics in this qualitative study is very important as this is vital in research ethics. In the conduct of this research study, it is implied that voluntary participants should not experience harm and that their involvement and assistance provided the required information, negative events must not arise from their participation (Polonski, 2019).

To achieve ethical consent, the participants' permission was needed before carrying out an interview process (Creswell, 2015). They were informed that they have their ownership of the audio-recorded interview and the confidentiality of their identities. The participants were given informed consent for them to sign. However, they will not be forced to sign the form if they wish to withdraw their participation in the study as it is deemed voluntary.

As this research was conducted within the IP community, the indigenous culture, religion, or other differences of the participants were respected (Creswell, 2014). Additionally, the local Municipal Tribal Council was given a letter of intent detailing the nature and conduct of this study as it concerns some IP participants, the program,

and the school. Upon receiving notice, the researcher was invited by the Municipal Tribal Chieftain to personally present the purpose of the study to the Municipal Tribal Council and finally sought approval. The researcher also presented the study to the elders and members of the Manobo Tribe in Barangay Simulao, Boston, Davao Oriental during their tribal meeting to gain consensus.

The researcher believed that in carrying out this study there would be information that will be disclosed as intimate or harmful to the program. In the interview process, there is a possibility that questions may or may not be sensitive to participants. However, by listening to the participants' voices in their natural environments, the researcher has a clearer interpretation of their experiences (Orb, Eisenhauer, & Wynaden, 2000). Hence, in the gathering of data, the privacy of the participants remained confidential.

3.0 Results and Discussion

The data gathered on the experiences of the Science Teachers, six major themes have emerged and identified. To sort the major themes, three major themes were identified in the lived experiences of teachers teaching sciences in the IPEd program, one major theme was generated in the challenges encountered by science teachers in the IPEd program and two major themes were identified in the recommendation and suggestion of the science teachers in the challenges of IPEd program.

Lived Experiences of Science Teachers in the IPEd Program

Contextualized Teaching to the IP Learners

Learners are always the center of the educative process. Learners' needs are considered in the context of their social environment, diverse identities, interests, intelligence, and belief. These are the bases for teachers in developing instructional designs that include differentiated activities that suit the learners learning styles.

Moreover, teachers ensured that the classroom teaching is inclusive considering learners' diversity in culture and language. The language used as the medium of instruction was academically and socially contextual to address the learner's difficulty in understanding the concepts delivered during the instruction. Learners need have to be carefully addressed to manage the quality of the teaching and learning process. Nevertheless, these teachers emphasized that to enable them to adapt their lesson to the context of their learners, they need to address learners' needs by learning the learners' language by translating science terms to the mother tongue used by the cultural community.

The activities and materials used in teaching by the science teachers were adaptive and contextual the learners' cultural background to ensure that culture was integrated in the delivery of instruction.

Moreover, the findings of this study revealed that the teachers teaching science in the IPEd program were concerned about the language used in the medium of instruction to adapt on the context of the learners. They have thought that the quality of instruction and teaching and learning as a whole was affected by the language used in the delivery of instruction. To address learners' needs is to learn their language to established good communication and for teachers to effectively teach their lessons without the problem of understanding science concepts and terminologies. Consequently, Li & Li (2015) revealed that language in science is found to be in different levels. Some are rhetoric, lexical, and syntactic, and that the use of technical terms or jargons in science contribute obviously to the barrier in communication for teacher teaching science subject. It can only be addressed by lowering the barrier in teaching science through writing the science terms in bigger lettering and posting it on the wall where the learner can actually see it.

Moreover, it clearly revealed that in order for the lesson or activities to be understood by the learners, teachers must be able to understand and speak the language of the learners to ease the learner's difficulty in understanding science terms and concepts. Thus, learners' needs are addressed through learning their language.

Learning Assessment of the IP Learners

Assessment is a necessary process to evaluate learners on how well they learned the lesson strategically. It plays a significant role in the teaching and learning process as it measures student level of learning and the extent of how they successfully met the given learning objectives. It was good to note that during the interview, the participants stated that they used different types of assessments to assess the learners.

Moreover, one participant expressed that in assessing his learners he used questioning technique and experiment. He asserted that through asking questions, he can assess if his leaners understand well the topic and through experiment, he can also assess whether the learners have followed the given instructions amidst lack of materials in school.

To teach effectively, Edwards (2013) argued that science teachers have to focus on what they need to assess to make sure that their type of assessment is meaningful to the part of learners' development. With the different skills embodied in learning science, assessment is wide to accommodate different learning styles. On the other hand, Bangcaya & Alejandro (2015) affirmed that assessment is a good indicator of the quality of learning by determining whether the standards failed or succeed from the learners' achievement.

With the way the teachers assess the learners in teaching science, the participants admitted that the learners were given appropriate activities and were assessed using different types of assessment such as formative assessment, summative assessment, and performance assessment. The teacher also used experiments in assessing the learners' understanding of the lesson.

Moreover, Rustaman (2017) emphasized that the assessment in science is closely related to science instruction. Assessment can be differentiated depending on its nature. The assessment can be formative or summative.

Additionally, the assessment process in teaching science measures learner's competence on the imposed learning objectives. The type of assessment of teachers depends on the type of activities and instruction they prepared. There is an alignment of the assessed intended goal from the delivered instruction.

Culturally Sensitive Teaching

A policy framework was established by the Department of Education under the mandate of Republic Act No. 8371 or Indigenous Peoples Rights Act of 1997 to promote culture-based education. DepEd established the IPEd program for IP learners to access quality education. With this, education has become more inclusive.

In the teaching of science to the IPEd program, teachers have considered integrating culture to deliver their lessons. This makes the lesson culturally responsive to the needs of the students. Teachers prepared their lessons which are culturally sensitive as a response to learners who have cultural differences. Teachers also become inclusive in teaching their lessons to allow an atmosphere where different cultural beliefs are respected. Moreover, teachers are responsible for preserving the customs and traditions of the tribe through the integration of culture in lessons and activities to effectively teach the science subject without rolling out their cultural belief.

On that note, the integration of culture is important in the effective teaching of science without rolling out their cultural belief. The participants agreed that in order to teach science effectively to the IP learners, the culture is integrated to every lesson and activity. Consequently, Mercado (2020) specified that teachers have to emphasize that the lessons and instructional activities should highlight distinctiveness of the learners' culture. Teachers anchored the content of their lessons on the cultural practices of the learners. The design of learning activities is culturally responsive.

Furthermore, in the teaching of science, Pawilen (2013) believed that there is a need to integrate indigenous knowledge in the science curriculum. The integration of indigenous knowledge directly refers to culture as it demonstrates the cultural practices of the learners. This eventually claims that teachers are responsible in empowering the learners cultural background by maintaining culture-based teaching. With the participants' claim in the integration of culture in teaching, Shizha (2007) stated that to effectively teach science in the context of culture of the learners, teachers have to prepare lesson contextual to the learners' culture effectively. Teachers should consider integrating indigenous knowledge in designing their lessons. Nevertheless, in the integration process, teachers should point out their personal biases regarding their attitudes upon integrating.

Moreover, learning of IP learners are affected with the influence from their peers within the same cultural context who engaged in shared learning activities and acquire knowledge from it (Scott & Palincsar, 2003). Hence, teachers have to include in designing their lesson and learning activities the targeted learners who might differ in culture to allow differentiated activity pertaining to their cultural background. In this regard, teachers play a vital role in culture-based which promotes inclusive education. Integration is embodied in the instructional design delivered through instruction and activities that enables learners to value experience and culture.

Challenge in Teaching Science in the IPED program

Inadequacy of Materials in Science in the IPEd Program

The inadequacy of equipment and resources hinders the delivery of quality instruction of the participants. As they claim, the lack of equipment and materials in the conduct of experiments embodies the failure to transfer effective learning. Teachers are more concerned about laboratory works and experiments as the activities require apparatus found inside of the laboratory. Science teachers were able to assign learners to bring materials for the activities due to lack of equipment and laboratory apparatus in school. With that being said, only some was able

to provide the required materials because of different circumstances. Moreover, based on the interview results, science teachers found that the lack of equipment and resources is a major challenge in teaching science in the IPEd program.

Materials needed for the experiment must be met for effective teaching and learning process to happen. Nevertheless, these claims of the participants about the conduct of the experiment and lack of laboratory apparatus are supported by Pareek (2004). According to him, the presence of a laboratory yields a significant effect on students' academic performance, and the effect of conducting experiments to the learners are intended for them to improve their skills. This means that with the participants claims of the unavailability of materials, academic performance of the learners is significantly affected. The learners' laboratory skills are compromised as the concepts require a hands-on application. Moreover, with the unavailability of laboratory and materials, experiments are irrelevant. With the lack of laboratories, learners become inefficient in learning concepts in science. According to Antonio (2018), he argued that learners are interested in laboratory exercises. He added that teaching science subjects is appropriate in conducting laboratory experiments. This is significant because it supports theories, laws, and concepts learned in the instruction. With this kind of scenario as claimed by the participants, the interest of learners in learning science that requires the conduct of experiment is weakened.

Admittedly, Pingol, Roxas-Villanueva, & Tapang (2015) support the participants' claim. They said that Philippines has a problem with the adequacy of laboratory. The teachers' capacity to teach learners is hindered. The purpose of the laboratory in teaching is to support learner's idea and understanding. However, with the absence of hands-on activities due to lack of facilities science education is faced with a problem. Eventually, the problem of lack of laboratory and its materials demands serious attention from school and other offices concerned.

Coping Strategies of Science Teachers in the IPEd program

Ask Support from Tribal Council and DepEd

Participants lived experiences on the struggle of teaching science with the unavailability of materials reflects the need or support from the administration and government. With this difficulty, the participants admitted that they need to talk to the School Head to send out their concerns to inform the higher-ups of purchasing the essential materials for science activities. The participants' responses to the interview entailed that under the school level, they wanted to escalate the problem to the School Head as the administrator of the school to address it. The School Head has the responsibility to work on this matter as she is the direct representative of the school to the Division Office. The Division Office, on the other hand, is under the DepEd, a government agency for national education.

Consequently, Alabastro (2007) asserted that science education relies on the support of the government. The goal of quality science education lies in the sound administration from the national offices down to schools. This means that without government support to schools, the occurring problems will not be addressed. However, sending this concern to the higher-ups will generally give them the position to act and that it can only be managed if the School Head takes proper actions also on the matter. Moreover, the success of the IPEd program requires an excellent management system and commitment both from the national office and schools in the improvement of science equipment and facilities.

Flexible Teaching and Learning

The inadequacy of science laboratories, apparatus, equipment and materials in the teaching of science in the IPEd program directly involved the participants in finding alternative ways to deliver their lesson. The participants' way of coping from the encountered problem have been identified. However, the participants did not clearly state what alternatives or ways they will use in the delivery of their lessons.

Nevertheless, with the problems encountered by the participants in teaching science in the IPEd program, looking for an alternative way to deliver the lesson remains the only option. The participants expressed their thoughts that to continue the delivery of lessons amidst existing problems, resolving them relies on their strategy on how to cope with the challenges. As described by one of the participants, because of the lack of materials and the difficulty of replacing it with an alternative that works the same, contextualization is the way to deliver the lesson based only on the available materials found within the cultural community. Halasan (n.d.) believed that science teachers could use the IKSPs in teaching inside the classroom. These IKSPs, an intricate collection of know-how practices, are the alternative way of teaching the subject. In teaching science, teachers

can use traditional methods of measurement to replace the International Standard (SI) unit and use of herbal medicines in health practices instead of pharmacy-bought medicines.

4.0 Conclusion

The teachers who are teaching science subjects in the IPEd program may enhance the teaching and learning by duly recognizing learners' difficulties in accomplishing science tasks, learn and use the native language of the indigenous community and contextualize the lessons and instruction to the cultural background of the learners. Despite the challenges, these science teachers are coping with the demands of teaching science in the IPEd program.

The results of this research specified the experiences of science teachers in the IPEd program and problems they faced in handling the science subject. The experiences of science teachers in the delivery of their lessons were identified, such as science lessons should be contextualized to the culture of the learners. Moreover, in a culturally rooted teaching, language is part of contextualizing lesson to IP learners' cultural background. In teaching the science lessons to IP learners, it was found out that language was a barrier because IP learners have the difficulty to understand science concepts and ideas which are in English. Thus, science teachers should learn the language of the indigenous community to translate the concepts and ideas in science to the IP learners.

Moreover, science teachers employed different types of assessments to measure and evaluate how much the IP learners have learned the lessons and accomplished their assigned tasks. The assessments were established in a formative, summative, and performance ways. Additionally, these science teachers considered sensitivity in designing and delivering their lessons in terms of the learners' culture even with the assessments. In order for their teaching to be culturally sensitive, they have integrated customs and traditions of the Manobo in their lessons and made sure that it does not mock cultures by making it inclusive to different cultures as well.

The results also manifested the inadequacy of learning materials in the IPEd program. Science teachers faced problems vis-a-vis in delivering quality education to the IP learners because the school lacks the relevant materials for instruction and activities. The school also lacks the facilities and equipment such as laboratory which is essential in doing experiments that affects the learners' ability to perform hands-on application of the theories and ideas they learned. Therefore, the experiments were limited to perform due to lack of laboratory apparatuses.

Consequently, the inadequacy of learning materials in the IPEd program could be aided by DepEd and the Tribal Council of the Manobo Tribe. The science teachers pinpointed that they have to seek support from DepEd through the recommendation of the school head concerning the inadequacy of the materials for science teaching. They emphasized that the school should allocate funds in purchasing the learning materials in science to effectively teach science lessons. Moreover, the science teachers also recognized the role of the Tribal Council as an immediate government of the IP community in strengthening the IPEd program. The Tribal Council can contribute to the problem by purchasing the relevant learning materials in science for the IPEd implementing schools. Thus, with these problems in the IPEd program, science teachers should always be flexible in teaching the IP learners.

These issues in science education in the IPEd program were also observed by school administrator, parent and learner. All of the issues were manifested in their responses. It was found out that quality and culturally responsive education is important for the Manobo Tribe. The IP learners in the IPEd program should experience meaningful learning in science by doing experiments similarly with other schools. However, they also noticed the lack of science materials to support learning such as laboratory and other quintessential learning materials. They emphasized that support from DepEd and Tribal Council can help resolve the problems in science education and reform the IPEd program.

Moreover, the Sociocultural Theory of Lev Vygotsky was deemed necessary because science teachers were able to teach the IP learners amidst differing cultures. The IP learners were able to learn the lessons brought about by social interactions with their peers and teachers. These social interactions have resulted to learned behavior which is useful for the IP learners. Despite those issues and challenges, these science teachers teaching in the IPEd program were using coping strategies to address the challenge, such as modifying their lessons using available materials present and contextualization of the lesson to the culture of the learners to effectively teach science in the program even with the issue of lack of resources for science. Nevertheless, these science teachers desire the need for science learning resources such as science laboratory and learning materials to pursue effective teaching to instill to the learners the value of a complete, meaningful and effective science education.

5.0 Contributions of Authors

Indicate the contribution of each author. Example: AA – editing, writing, supervising, BA – data analysis, encoding, etc.

6.0 Funding

None

7.0 Conflict of Interests

None

8.0 Acknowledgment

None

9.0 References

Alabastro, E. (2007). Government's Support to Science Education. *Transactions of the National Academy of Science and Technology*, *29*(1), 202–211.

Antonio, V. (2018). Science Laboratory Interest and Preferences of Teacher Education Students: Implications to Science Teaching. *Asia Paciific Journal of Multidisciplinary Research*, *6*(3), 57–67.

Bang, M., & Medin, D. (2010). Cultural Processes in Science Education: Supporting the Navigation of Multiple Epistemologies. *Science Education*, *94*(6), 1008–1026.

Bang, M., Medin, D., & Cajete, G. (2009). Improving Science Education for Native Students: Teaching Place Through Community. *Sacnas News*, *12*(1), 8–10.

Bangcaya, P., & Alejandro, G. J. (2015). School-Related Factors Contributing to the Delivery Enhancement of the Special Sience Program in Western Visayas, Philippines. *European Journal of Science and Mathematics Education*, *3*(2), 177–184.

Bolderston, A. (2012). Conducting a Research Interview. *Journal of Medical Imaging and Radiation Sciences*, *43*(1), 66–76.

Canlas, I. P., & Karpuwedan, M. (2020). Consensus in Science Education. *Quality Education*, *1*(1), 1–11.

Carter, L. (2017). Chapter Twenty: The Challenges of Science Education and Indigenous Knowledge. In *Counterpoints* (Vol. 379, pp. 312–329).

Creswell, J. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). Thousand Oaks, California: SAGE Publication, Inc.

Creswell, J. (2015). Writing Strategies and Ethical Considerations. In *Research Design: Qualitative, Quantitative and Mixed Methods Approches* (pp. 87–93). SAGE Publication, Inc.

Cyparsade, M., Auckloo, P., Belath, I., & Hurreeram, N. (2013). Beating the Language Barrier in Science Education: In-service Educators' Coping with Slow Learners in Mauritius. *Science Education International*, *24*(4), 402–415.

Department of Science and Technology, & University of the Philippines-National Institute for Science and Mathematics Education Development. (2011). *Science Framework for Philippine Basic Education*. Manila: Science Education Institute, Department of Science amd Technology and University of the Philippines National Institute for Science and Mathematics Education Development.

Edwards, F. (2013). Quality Assessment by Science Teachers: Five Focus Areas. *Science Education International*, *24*(2), 212–226.

Gudula, Z. (2017). *The Influence of Language on the Teaching and Learning of Natural Sciences in Grade 7*. University of the Western Cape.

Halasan, R. (n.d.). *How indigenous people education programs in the philippines adapt in a diverse society?[PowerPoint slides]*. National Library of the Philippines. Retrieved from http://web.nlp.gov.ph

Hauser, V., Howlett, C., & Matthews, C. (2009). The Place of Indigenous Knowledge in Tertiary Science Education: A Case Study of Canadian Practices in Indigenising the Curriculum. *Australian Journal of Indigenous Education*, *38*(1), 46–58.

Kharisma, B., & Pirmana, V. (2013). The Role of Government on Education Quality and its Provision: The Case of Public Junior Secondary School among Provinces in Indonesia. *European Journal of Social Sciences*, *37*(2), 259–270.

Li, X., & Li, L. (2015). Characteristics of English for Science and Technology. *International Conference on Humanities and Social Science Research*, (September), 161–165.

Ngema, M. H. (2016). *Factors that cause performance in science subjects at Ingwavuma Circuit*. University of Africa.

Orb, A., Eisenhauer, L., & Wynaden, D. (2000). Ethics in Qualitative Research. *Journal of Nursing Scholarship*, *33*(1), 93–96.

Pacquing, G. J. (2018). Goals of science education in the Philippines. *DepEd Bataan Publications*, *1*(1), 1–11.

Palys, T. (2008). Purposive Sampling. *The Sage Encyclopedia of Qualitative Research Methods*, *2*(1), 697–698.

Pareek, R. B. (2004). An Assessment of Availability and Utilization of Laboratory Facilities for Teaching Science at Secondary Level. *International Council of Association of Science Education*, *30*(1), 75–81.

Pawilen, G. (2013). Integrating Indigenous Knowledge in the Elementary Science Curriculum. *Harris Education Journal*, *1*(1), 21–31.

Peniero, T. F., & Toshihiko, M. (2020). Science Teaching and Learning in Japan and the Philippines: A Comparative Study. *Universal Journal of Educational Research*, *8*(4), 1237–1245.

Pingol, J. R., Roxas-Villanueva, R. M., & Tapang, G. (2015). VISSER: Addressing the Need for Modern Science Laboratories in the Philippines. *The International Academic Forum*, *1*(1), 1–8.

Polonski, R. (2019). Ethical Considerations. In *The Foundations* (pp. 53–76). SAGE Publication, Inc.

Prinsloo, C., Rogers, S., & Harvey, J. (2018). The Impact of Language Factors on Learner Achievement in Science. *South African Journal of Education*, *38*(1), 1–14.

Rogayan, D. V. (2019). Retrospective Evaluation of the Science Education Program in a Philippine State University. *International Journal of Innovation, Creativity and Change*, *8*(7), 352–369.

Rustaman, N. (2017). Assessment in Science Education. *Journal of Physics: Conference Series*, *895*(1), 1–7.

Scott, S., & Palincsar, A. (2003). *Sociocultural Theory* (pp. 1–10). pp. 1–10. Retrieved from http://www.education.com/reference/article/sociocultural-theory/1

Shizha, E. (2007). Critical Analysis of Problems Encountered in Incorporating Indigenous knowledge in science teaching by Primary School Teachers in Zimbabwe. *Alberta Journal of Educational Research*, *53*(3), 302–319.

Soetan, A., Onojah, A., Oluwakemi, A., Ayodeji, A., Janet, A., & Olabo, O. (2020). Secondary School Teachers' Utilization of Indigenous Instructional Resources in Teaching Basic Technology in Kwara State. *Epiphany*, *13*(1), 63–74.

Victor, M. L., & Yano, B. (2015). Actualizing the Inclusion of Indigenous Peoples' Rights in Education: A Policy Initiative in the Philippines. *Human Rights Education in Asia-Pacific*, *6*(1), 133–161.

Vygotsky, L. (1978). *Mind in Society: The Development of Higher Psychological Processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Cambridge, Massachusetts: Harvard Univeristy Press.