IJIET, e-ISSN 2548-8430, p-ISSN 2548-8422, Vol. 8, No. 2, July 2024, pp. 285-293

International Journal of Indonesian Education and Teaching
http://e-journal.usd.ac.id/index.php/IJIET
Sanata Dharma University, Yogyakarta, Indonesia

HOW DO FILIPINO TEACHERS INTERPRET SUSTAINABILITY DEVELOPMENT GOALS IN SCIENCE LESSON (AN INTERPRETATIVE PHENOMENOLOGICAL ANALYSIS)

Wahyu Wido Sari[1*] and Genesis E. Lalas[2]
[1]Sanata Dharma University, Indonesia
[2]Silliman University, Philippines
w.widasari@usd.ac.id[1] and genesiselalas@su.edu.ph[2]
*correspondence: w.widasari@usd.ac.id
https://doi.org/10.24071/ijiet.v8i2.7611
received 1 December 2023; accepted 11 July 2024

Abstract
The approach of this study was to interpret the perception of Filipino teachers on Sustainable Development Goals (SDGs) in K-12 Science lessons using an Interpretative Phenomenological Analysis (IPA). The findings of this research showed linkages between Quality Education, Education for Sustainable Development, and Disaster Risk Reduction. Participant 1 (FLE) and colleagues conducted a Project-based Learning to encourage students to solve environmental problems. This resulted in a White paper submission to the International Kids Conference 2022. The project reflected a strong implementation of SDGs 1, 2, 7, 8, 9, 12, and 13. Participant 2 (NM) implemented SDGs in the form of worksheet activities with open-ended questions for students to come up with many possible answers. This resulted in a strong implementation of SDGs 2, 4, 6, 7, 9, and 13. Participant 3 (JCT) promoted students' designs on Infographics about Environmental Disasters and endorsed those in a special event that promotes Earth Days. This resulted in the implementation of SDGs 3, 13, 14, 15, and 16. The analysis showed an applied proof of improved quality of teaching through Project-based Learning that established a safe and effective learning environment, and an inspiring cooperative and transformative learning.

Keywords: Filipino teacher, K-12 curriculum, science lesson, sustainable development goal, phenomenology

Introduction
Determining the improvement of human well-being and its link to Sustainable Education has become crucial over time (United Nations University, 2006). In 2000, there was a global effort, as part of the Millennium Development Goals (MDGs), to tackle the indignity of poverty that involved different countries working together. This goal was then superseded by the Sustainable Development Goals (SDGs) in 2015, which became essential in achieving a Sustainable Tomorrow by 2030 (The 17 Goals, 2015). A complex concept, such as human well-being, extends many ideations with its explicit distinctiveness (Clark, 2014).

This work is licensed under CC BY-SA.
Creative Commons Attribution-ShareAlike 4.0 International License.

The sustainable development goals outlined by the United Nations encouraged all learners to acquire the knowledge and skills required to promote Sustainable Development and address sustainability issues through development education, education for sustainable development, and global citizenship education (O'Flaherty & Liddy, 2017). Education for sustainability is defined, with emphasis, as a curriculum where students actively study the root causes of unsustainable activities and actively plan for and incite change in areas that are less well-known and less often used (Kennelly et al., 2012).



Figure 1. The seventeen sustainable development goals

The teacher played an important role in translating the curriculum into a learning process in the classroom. Lawale and Bory-Adams as cited in Turkmen (2022) suggested that SDGs integrated into lessons provide a convenient learning environment for the four pillars of learning, learning to know, learning to do, learning to live together, and learning to be. Some approaches that can be used are project-based learning, problem-based learning, or inquiry-based learning.

Literature Review

O'Flaherty and Liddy (2017) pointed out that the practice of teaching development education and education for sustainable development, as well as educational policy and rhetoric, all reflect the increasingly global nature of contemporary education. Therefore, in order to achieve student learning objectives, highly qualified teachers are crucial (Seebruck, 2015; Sirait, 2016).

The effectiveness of teachers played a vital role in raising education's overall quality (Peterson, 2000). This necessitated interventions to enhance instructors' teaching abilities to meet educational goals, especially for public schools (Darling-Hammond, 1990; Darling-Hammond et al., 2017). Additionally, the maintained competence of instructors has necessitated investing in training and development (Roberto & Madrigal, 2018). Similarly, science instructors have been competent in assisting their students create practical ventures utilizing their critical thinking skills and "out of the box" viewpoints (see also Aparecio, 2018).

Owston et al. (2008) discovered that teacher attitudes and content understanding were positively impacted by science teacher training programs. Ertikanto and colleagues (2017) also claimed that attending training programs helped primary teachers learn new abilities. Teachers who have received training can coach students to help them do better on their science investigation projects (Aparecio, 2018). According to the literature, teacher training programs include a

variety of goals and settings. Evaluation can be a useful technique for establishing whether these goals were achieved and for ensuring that the training is more relevant to learners' professional roles (Nemec, 2018).

Information and Communication Technology (ICT) training programs have a favorable attitude and competence influence on teachers (Dela Fuente & Biñas, 2020; Karagiorgi & Charalambous, 2006). A shift toward constructive teaching methods can be aided using ICT, and constructive teaching methods can increase the use of ICT in education. (UNESCO, 2011). In order to transform pedagogy and give students more agency, UNESCO (2018a) stressed the significance of incorporating ICT in schools and classrooms. Databases, spreadsheets, and graphing tools can be used to teach science courses, and ICT enhances education in this field in a variety of ways. (Demkanin et al., 2008). Because of this, teachers have adapted their teaching methods to fit the demands and learning preferences of their students. Similar outcomes involved student understanding of scientific ideas and the expansion of their scientific knowledge were validated when using ICT in the teaching of Physics (Mohammed, 2013; Wu & Glaser, 2004).

Method

The research questions were [1] How is the implementation of the teaching of natural sciences based on SDGs in the K-12 curriculum, and [2] How was the teacher's interpretation of the implementation of natural science based on SDGs in the K-12 curriculum?

To respond to both research questions, a Phenomenological Approach of Qualitative Research was adopted. The main purpose of those questions was to describe the implementation of the K-12 curriculum that relates to SDGs. This became the basic consideration for the adoption of the approach. Kahija (2017) explained that phenomenology would describe the experience as purely, genuine, and original.

The research design was explained in (Figure 1 research design) as the researchers used Interpretative Phenomenological Analysis (IPA). IPA aimed to explore in detail how participants are making sense of their personal and social world. The main currency for an IPA study was the particular experiences, events, and states of the participants. The approach was phenomenological which involves a detailed examination of the participant's experiences. It attempts to explore personal experience and is concerned with an individual's perception or account of an object or event, as opposed to an attempt to produce an objective statement of the object or event itself (Kahija, 2017).



Figure 1. Research design

The analysis of data started with [1] reading of exploratory notes; [2] formulating experiential statements, finding connections, and clustering experiential statements; and [3] to conclude, the report was compiled according to the respondents' experiential themes (Smith & Nizza, 2022).

Findings and Discussion

Teachers background

The first participant was FLE, a math and science teacher from Negros Oriental and currently pursuing PhD in education. FLE taught math for grades 7 and 11, Araling Panlipunan for grade 10, and MAPEH for grade 7. The second participant (NM) was a science teacher from one of the integrated schools in Iloilo. A graduate of MAEd and handled science 7. NM was a very passionate and innovative teacher. The last participant, JCT, was a science teacher from one of the integrated schools in Siocon, Zamboanga del Norte. JCT had 14 years of experience teaching science and currently pursuing PhD in education.

Curriculum development for implementing the SDGs

Sustainable Development Goals (SDGs) were a world agenda to make a better future and had 17 goals (Cottafava et al., 2022). These were (1) no poverty, (2) zero hunger, (3) good health and well-being, (4) quality education, (5) gender equality, (6) clean water and sanitation, (7) affordable and clean energy, (8) decent work and economic growth, (9) industry, innovation and infrastructure, (10) reduced inequality, (11) sustainable cities and communities, (12) responsible consumption and production, (13) climate action, (14) life below water, (15) life on land, (16) peace and justice strong institutions, and (17) partnerships to achieve the goal (*un.org*). Some of these goals were shown in the K-12 Curriculum in the Philippines, which also included disaster lessons at the Secondary level. The teachers developed the curriculum by preparing the lesson plans, where teachers used their creativity and innovation by adapting a project-based learning approach. In this research, it was observed that teachers incorporated SDGs into the curriculum.

Teachers' interpretation of the SDG in the K-12 curriculum

The research participants came from three different areas that have students within the middle-class economy background. Their schools were located in a mountainous area surrounded by farms where most of the students came from farming families.

The first participant (FLE) was pursuing PhD in Education and said that their school was situated in a mountainous area where sugar cane fields were abundant. The parents of the students were working as farmers, and some were domestic helpers, despite this they still required help from their children to make ends meet. The school was relatively new and still developing buildings and facilities.

"*However, the school still struggles to increase its enrolees"* (FLE, Q2).

The school has wonderful and creative teachers that encouraged students to learn more. From the in-depth interview, FLE did not understand SDGs, despite it being unconsciously practiced and incorporated in the lectures. FLE believed that science and math were subjects that helped students understand their daily lives. An example that gave a better interpretation of the Curriculum Implementation of SDGs, FLE together with colleagues, used project based learning to integrate SDGs in subjects like English, math, social studies, and topics about disaster.

> "*We use the prescribed K-12 curriculums by the government since this is a public school. This curriculum was designed I think to make our graduates globally competitive"* (FLE, Q6).

Knowing that The Philippines was always struggling with disasters,

> *"K-12 also has studied about the disaster, and I think there's also an implementation of SDGs here"* (FLE, Q5).

It encouraged students to solve problems about the environment as well as their daily needs. With that initiative, 2 groups have proposed interesting solutions. With coaching and mentoring, the students wrote a paper and presented the result at the International Kids Conference in November 2022.

The first project called *Eternal 4.0* was relevant to English, science, math, art, disaster, entrepreneurship, and social science subjects. In this project, students produced Christmas and home decorations from upcycling plastic that had been collected from sari-sari stores. This project showed the implementation of SDGs 1, 2, 7, 12, and 13. FLE aimed to help the environment through this project to encourage recycling and upcycling.

Project 100, the second project, was relevant to English, science, math, entrepreneurship, and social science. The students utilized natural food ingredients to make their local delicacies. SDGs 1, 2, 8, 9, 12, and 13 were implemented in this project. FLE mentioned that their school was struggling with infrastructure, especially with the internet. This challenge even encouraged the students to do better. FLE and colleagues helped the students create their eco packaging and brand logo using Canva, which implemented an ICT lesson in the class. Despite missing the event due to power and internet interruption, FLE, with the help of ICT, enabled the preparation of video presentations to be submitted to the International Kids Conference.

The second participant came from Iloilo City, which was located in Western Visayas.

> *"…have a Dinagyang festival that features dancers with elaborate costumes and headdresses"* (NM, Q2).

NM knew about SDGs but was not aware of their incorporation into the national curriculum. Naturally, as a science teacher, NM encouraged the students by implementing SDGs in their science class, and somehow concerned, *"…the challenging part is the lack of gadgets for presentation*" (NM_Q3). After discussing SDGs, NM stated that the implementation of SDGs in their daily lessons *"…will help students to understand how to use their creativity to protect their environment. I mean make it sustain so the next generation still has the same environment. Also, better education"* (NM_Q8). To implement SDGs, NM created science worksheet activities with open-ended questions with many possible correct answers. He believed that "*…output based on learners' understanding applied in Art or Music or Health or Literature. Lesson planning can be creative by way of preventing various learners-centered activities in pairs and groups to foster the spirit of collaboration and creativity"* (NM_Q2).

During lesson planning, the students' backgrounds were considered, especially the culture, to provide lessons relatable in their lives. This is reflected by the way activities were conducted in pairs. In the private conversation, NM mentioned that whenever possible he combined Art and Music. "*I am writing a science storybook to help the students understand about the environment"* (NM-Q8). The class was strong in implementing SDGs 2, 4, 6, 7, and 13. ICT as a tool to improve teaching in the classroom had been used by NM and interpreted SDG number 9 as an innovation in learning and teaching by providing some multimedia materials for the students.

The third teacher, JCT, knew about SDGs actively campaigned for environmental safety, and was inspired to join a special event that promotes Earth Days. JCT knows that SDGs run from 2015 to 2030,

> "*so far I understand, it is facing so many big problems in the world. It was made by the United Nations to help the world heal; I think it will be interesting if we can implement it in our curriculum"* (JCT_Q2).

He also mentioned that K-12 has subjects that relate to SDGs. *"Yes. I localized materials so my students would contextualize it"* (JCT, Q4). The other answer mentioned in the private communication, in April 2023 *"...not only about disaster but also about entrepreneurship. As a high school science teacher, sometimes I encourage my students to design their solutions to get money. For example, ukay-ukay. Ukay-ukay makes the pre-loved things still useful and last longer, and the students can learn about business, so we call it nature-friendly business."* JCT had no idea that K-12 contained several subjects that relate to SDGs.

However, after the conversation, he realized and mentioned a subject that may be related to SDGs. JCT utilized SDGs incorporated in K-12, which resulted in the implementation of SDGs 3, 13, 14, 15, and 16. An example of these implementations is in October 2022, JCT supported the Science Club students to make Infographics that guided the community when a disaster (especially a typhoon) hit their place. Heavy rain also caused flooding in Siocon. JCT said that:

> "*the goal was not about inspiring or winning a competition, it's about how to encourage students to help their family and community during a disaster*" (private communication, December 2022).

As an achievement, one of the group of students received a special award during the International Kids Conference in 2022. The interrelationship of human beings and the natural world, and the influence of the physical environment on a community's social and cultural development, was graphically demonstrated in societies that face the persistent threat (and reality) of disaster (Bankoff, 2007).

The findings of this research showed that the teachers know about SDGs which are organized by the United Nations. The teachers were not aware that the National Curriculum of the Philippines contained sustainability goals in the subjects, especially in language, science, and *Araling Panlipunan*. These were implemented in the classroom and there were known linkages between quality education, education for sustainable development, and disaster risk reduction, especially with the project that FLE and JCT did in their schools. Didham and Manu

(2020) found that the linkages may be strengthened and functionalized through the application of adaptive capacity as a common learning objective.

The three participants showed and applied a well-developed curriculum. They improved their quality of teaching through project-based learning. In that project, they established a safe and effective learning environment, inspiring cooperative and transformative learning. The best measure of development would be the ability of every human being to realize his or her full potential in life, both in terms of nurturing individual qualities, personality, and capacities and contributing to the improvement of society (Crone & Dahl, 2012).

Conclusion

The Science teachers (participants) gave their understanding of SDGs reflected in the K-12 curriculum as enabling lessons to help fight against poverty, improve health and well-being, clean environment, economic growth, and climate action. These goals were depicted in Science, Language, and Disaster lessons at the Secondary level.

The result of this research proved that there are linkages between quality education, education for sustainable development, and disaster risk reduction, especially with the projects that the target participants initiated in their respective schools. Through these initiated projects, the participants were able to put into practice and understand the value of sustainable development goals most genuinely. Overall, the participants' competency showed their effectiveness in necessitating interventions to meet educational and community goals.

The Interpretative Phenomenological Analysis (IPA) offered deep insights into individual experiences but sometimes it would not capture broader trends applicable to a larger population. Indeed, this method requested a small sample size of participants which restricts the generalizability of the findings. Finally, the research captured a specific time frame and was influenced by the researchers' perspectives, leading the potential biases in data interpretation.

Future research should consider expanding the sample size to include a more diverse group of teachers from various regions (as the Philippines consists of 81 provinces) and educational settings to enhance generalizability. Investigating the impact of different levels of infrastructure, resources, and professional development on the effectiveness of SDG integration could offer deeper insights. Addressing these aspects would contribute to a more holistic understanding of how Sustainable Development Goals could be effectively integrated into educational curricula and improve teaching practices.

References

Aparecio, M.B. (2018). Mentoring, self-efficacy, and performance in conducting investigatory projects: A mixed-method analysis. *Asia Pacific Institute of Advanced Research, 4*(2), 65-76. https://doi.org/10.25275/apjcectv4i2edu7.

Bankoff, G. (2007). Living with risk; Coping with disasters: hazard as a frequent life experience in the Philippines. *Education about Asia, 12*(2), 26-29.

Clark, D. A. (2014). Defining and measuring human well-being. In B. Freedman (Ed.), *Global environmental change: Handbook of global environmental pollution* (Vol 1, pp. 833–855). Dordrecht: Springer. https://doi.org/10.1007/978-94-007-5784-4_66.

Cottafava, D., Ascione, G.S., Corazza, L., & Dhir, A. (2022). Sustainable development goals research in higher education institutions: An interdisciplinarity assessment through an entropy-based indicator. *Journal of Business Research, 151,* 138-155. https://doi.org/10.1016/j.jbusres.2022.06.050.

Crone, E. A., & Dahl, R. E. (2012). Understanding adolescence as a period of social–affective engagement and goal flexibility. *Nature Reviews Neuroscience, 13*(9), 636–650. https://doi.org/10.1038/nrn3313.

Darling-Hammond, L. (1990). Teacher evaluation in transition: Emerging roles and evolving methods. In J. Millman & L. Darling-Hammond (Eds.), *The new handbook of teacher evaluation: Assessing elementary and secondary school teachers* (pp. 17–32). Newbury Park, CA: Sage.

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development.* Palo Alto, CA: Learning Policy Institute.

Dela Fuente, J. A., & Biñas, L. C. (2020). Teachers' competence in information and communications technology (ICT) as an educational tool in teaching: An empirical analysis for program intervention. *Journal of Research in Education, Science and Technology, 5*(2), 61-76.

Demkanin, P., Kibble, B., Lavonen, J., Guitart, J., & Turlo, J. (2008). *Effective use of ICT in science education.* Edinburgh: Bob Kibble, School of Education, University of Edinburgh.

Ertikanto, C., Herpratiwi, Yunarti, T., & Saputra, A. (2017). Development and evaluation of a model-supported scientific inquiry training program for elementary teachers in Indonesia. *International Journal of Instruction, 10*(3), 93-108. https://doi.org/10.12973/iji.2017.1037a.

Karagiorgi, Y., & Charalambous, K. (2006). ICT in-service training and school practices: In search for the impact. *Journal of Education for Teaching, 32*(4), 395-411. https://doi.org/10.1080/02607470600981995.

Kennelly, J., Taylor, N., Maxwell, T., & Serow, P. (2012). Education for sustainability and pre-service teacher education. *Australian Journal of Environmental Education, 28*(1), 57–58.

Mohammed, S. A. (2013). Promoting scientific literacy by using ICT in science teaching. *International Education Studies, 6*(9), 175-186. https://doi.org/10.5539/ies.v6n9p175.

Nemec, P.B. (2018). Training evaluation. *Psychiatric Rehabilitation Journal, 41*(1), 80–81. https://doi.org/10.1037/prj0000291.

O'Flaherty, J., & Liddy, M. (2017). The impact of development education and education for sustainable development interventions: A synthesis of the research. *Environmental Education Research, 24*(7), 1031–1049. https://doi.org/10.1080/13504622.2017.1392484.

Owston, R.D., Sinclair, M., & Wideman, H. (2008). Blended learning for professional development: An evaluation of a program for middle school mathematics and science teachers. *Teachers College Record, 110*(5), 1033-1064.

Peterson, K. D. (2000). *Teacher evaluation: A comprehensive guide to new directions and practices* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Roberto, J., & Madrigal, D. (2018). Teacher quality in the light of the Philippine professional standards for teachers. *Philippine Social Science Journal, 1*(1), 67-80. https://doi.org/10.52006/main.v1i1.13.

Seebruck, R. (2015). Teacher quality and student achievement: A multilevel analysis of teacher credentialization and student test scores in California High Schools. *McGill Sociological Review, 5*, 1-18.

Sirait, S. (2016). Does teacher quality affect student achievement? An empirical study in Indonesia. *Journal of Education and Practice, 7*(27), 34-41.

Smith, J. A., & Nizza, I. E. (2022). What is interpretative phenomenological analysis? In J. A. Smith & I. E. Nizza (Eds.), *Essentials of interpretative phenomenological analysis* (pp. 3–10). Washington DC: American Psychological Association. https://doi.org/10.1037/0000259-001.

The 17 Goals. (2015). Sustainable development. Retrieved from https://sdgs.un.org/goals.

Turkmen, H. (2022). Science teachers' view on sustainable development in COVID-19 pandemic process. *Journal of Science Learning, 5*(3), 531-539.

UNESCO. (2011). ICT competency framework for teachers. Retrieved from http://unesdoc.unesco.org/images/0021/002134/213475E.pdf.

UNESCO. (2018a). World teachers' day: Quality education requires well-trained teachers. Retrieved from https://iite.unesco.org/news/world-teachers-day-quality-education-requires-well-trained-teachers/.

United Nations University. (2006). Understanding human well-being. Retrieved from http://dro.deakin.edu.au/view/DU:30028707.

Wu, Z., & Glaser, R. E. (2004). Software for the synergistic integration of science with ICT education. *Journal of Information Technology Education, 3,* 325–339. https://doi.org/10.28945/305.