Navigating Uncertainty: Exploring Science Teaching in The Era of the New Normal

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Abstract. To create a theoretical framework, this study examined new areas of providing high-quality science education in the new normal setting. Using Colaizzi's method for data analysis, the research used grounded theory methodology to identify emerging themes in the data. To gain a deeper understanding, these motifs were subjected to interpretive phenomenological analysis (IPA). In-depth one-on-one interviews were the main method used for data collecting. Four main themes came out of this process: technology and multimedia integration, learning competency-based evaluation, focused learning competencies, and pertinent instructional materials. To find and classify sub-themes, researchers conducted additional analysis on these main topics. The New Normal Learning Pedagogy Theory in Science Education, which combines important ideas from the primary and subthemes, is the product of this study. The goal of this thorough theory is to guide instruction in the new normal period.

Keywords: learning pedagogy, learning competencies, instructional materials, science education, new normal

1 Introduction

For science teachers, there are a variety of new instructional challenges brought forth by the new normal. Teachers have faced challenges related to equity, diversity, and providing access for all students. Science educators continue to be industrious and committed to their goal of guiding the current generation toward disruptive education despite these obstacles. Science education has not been immune to the extraordinary changes brought about by the pandemic in the worldwide education community. With the temporary closure of educational institutions, teachers have had to adapt to new modes of instructional delivery and learning continuity. In this context, the researcher explores how science teaching can be made more effective and engaging for students in the new normal.

In this era of the new normal, it is more important than ever to foster a sense of hope and optimism among students. Science education can play a key role in this regard by

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providing students with the tools they need to understand and address the challenges facing our world today. By encouraging students to think critically and creatively about scientific concepts and help them develop the skills they need to become lifelong learners and problem-solvers.

Navigating the new normal is essential to remaining reflective and even-handed in different approaches to science teaching. By acknowledging the challenges faced by students and educators and working together to find innovative solutions that meet the needs of all learners, whether through online learning platforms or in-person instruction, science education has a vital role to play in shaping the future of our world.

Regarding the aforementioned assertion, it seems that schools' capacity to swiftly adopt new technologies, set up suitable infrastructure, and organize partners to create alternate learning curricula was a major factor in the deluge of innovations in the field Mukhtar (2020) highlights the benefits of distance learning, like its convenience and accessibility, but it also has drawbacks, including its inefficiency and difficulty upholding academic integrity. Apart from the difficulties associated with the revised structure of learners' ongoing education, Franchi (2020) also brings up concerns about the future of students using new modalities.

The researcher carried out this investigation given the previously indicated condition of the Philippine educational system. This study examined scientific teaching arrangements, including learning skills, instructional material preparations, instructor alignments to give lessons, motives, methods, and assessment changes in the new normal through the application of thematic analysis of grounded theory. With amazing objectives, the investigation's findings provided standard knowledge for educators, mentors, parents, and most importantly students. Nonetheless, during and after these challenging times, this information helped to improve guidelines, methods, and modalities. This trip could be used by future analysts to advance their observational thinking.

2 Methods

2.1 Research Design

This research paper used grounded theory, qualitative research design. According to Creswell (2013), the emergent theory is considered "grounded" or firmly based on the evidence, resulting in a more advanced explanation compared to a hypothesis generated from previous studies. In addition to the generation of novel ideas, Bound (2011) pinned that grounded theory can be seen as a systematic approach to analyzing data with the aim of uncovering latent theories.

As applied in this study, the natural environment was the firsthand teaching experiences of the Science Senior high school teacher in the context of lockdown of the research locale. Thus, this study followed the characteristics of a qualitative research.

2.2 Respondents of the Study

The study was conducted in the Schools Division of Cabanatuan City, Philippines. The researcher employed purposive sampling technique in selecting the participants of the study. Creswell and Plano Clark (2018) emphasize purposive sampling as a technique that involves identifying and selecting individuals or group of individuals that are especially knowledgeable about or experienced within a phenomenon of interest. For this reason, this technique is appropriate in selecting the participants who participated in the individual interview with regard to the components of the emerging modality. Consequently, participants were selected based on their direct involvement in the teaching of the subject, as they are the ones who have actually experienced the process, and therefore knowledgeable with regard to the components considered in the study.

2.3 Data Collection

Prior to data collection, the researcher sought approval from the concerned authorities. Upon approval of the proposal, the researcher utilized individual interview as the principal mode of data collection. A semi-structured interview guide to be constructed by the researcher was utilized to extract the basic parameters of phenomena with the view to maximum openness to what might be the aspects of it that matter most. The content validity of the constructed interview was assessed by experts.

2.4 Data Analysis

The researcher's theories about a topic were constructed based on the data to be collected. This is the central principle of grounded theory. In other words, by collecting and analyzing qualitative data, the researcher constructed a new theory that is "grounded" in data. Glaser & Strauss (2012) define the definition of grounded theory as the methodical development of theory using facts from social research. Therefore, rather than starting with the intention of testing a hypothesis, grounded theory starts with the collecting of evidence based on a question.

The following analysis was conducted on data collected from senior high school science teacher participants' responses about teaching modalities based on learning competencies, instructional material preparations, delivery of instruction, use of assessments, and teaching strategies employed by science teachers in the new normal: identifying recurring themes by a detailed examination of the data; assigning keywords and phrases to the emerging themes; organizing the codes into ideas in a hierarchical manner; and finally classifying the concepts based on relationship discovery. Ultimately, a new theory was developed based on the categories that were produced throughout this process and the connections that were discovered between them.

This study used Colaizzi's (1978) distinctive seven-step process to provide a rigorous analysis, with each step staying close to the data. The stages are illustrated below:

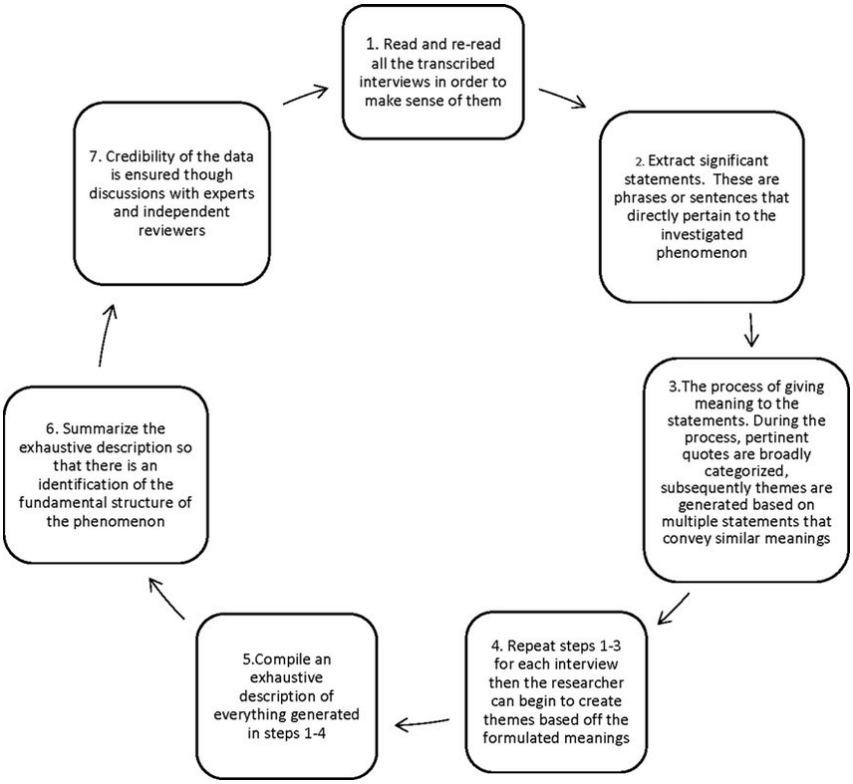

Fig. 1. A modified Colaizzi's seven-step method for data analysis

2.5 Ethical Considerations

In compliance with ethical practices in conducting a study, permission from the concerned authorities for the conduct of the study in the research locale was sought as well as the participants' informed consent to voluntarily get involved in the research. As a result, before doing any actions, an informed approval was obtained. Participants were provided with adequate information about the research so that they could decide whether to participate or not in the study. They were oriented on the importance of their "Informed Consent," which covers their anonymity, safety, and protection. Consequently, the researcher explained first the goal of the study, as well as the expected duration and duration of the teacher's participation. In addition, she emphasized the potential hazards and discomforts that participants might experience, as well as the research's benefits. Likewise, she made it clear that their involvement would be entirely voluntary. She also underlined their right to withdraw from the study at any moment, particularly if they were unsure about continuing.

In terms of confidentiality, which refers to a situation in which a researcher is aware of a study subject's identity but takes steps to prevent that identity from being revealed

to others, the researcher guaranteed the secrecy of informants along with data to be collected.

3 Results and Discussions

The researcher anchored the steps using Colaizzi's Thematic Process, and just like Colaizzi's, who asserted that all research occurred through dialogue and that asking the right questions was equivalent to eliciting an accurate description of the experience from the participants. (Colaizzi's, 1978). Hence, the IPA was also integrated in order to further establish a more coherent presentation of the themes. In such a case, the primary themes and subthemes clustered together, serving as the reference point for the results presentation.

3.1 Targeted Learning Competencies

First, the key topic that was recognized as arising from the responses was "targeted learning competencies." All participants agreed that the learning abilities were narrowly targeted, resulting in more specialized learning results. These results are consistent with the Basic Education Learning Continuity Plan (BE-LCP) and the streamlining of the curriculum to identify the Most Essential Learning Competencies (MELCs) as defined in DepEd Order Nos. 12 and 13 s. 2020.

The learning competencies were distilled into what is known as the most essential learning competencies (MELCs) to provide a sense of concentration. This result is in line with the research that Gastar and Linaugo did (2022), which emphasized the significance of alternative learning modalities when MELCs serve as the reference for lessons in acquiring knowledge and skills, particularly in Science subjects.

The second subtheme pertains to the reduction in the number of learning competencies. Participants noted that this measure became apparent with the identification of MELCs by the Department of Education. Similarly, Mendoza (2021) claimed that there is a substantial correlation between the distribution and identification of MELCs about the lessons that need to be addressed. This implies that the amount of MELCs included in the learning process within the framework and timescale of the new normal may have an impact on how science is taught.

The importance of certain learning competencies was expounded upon by fulfilling the requirements and circumstances of the learners. These results highlight the significance of taking learners' needs and well-being into account, which is a fundamental idea of learner-centered concepts in the teaching-learning process. Indeed, being an integral part of the K–12 mandates, student welfare has always been at the centre of the Philippine educational system.(Bernido, 2021). Even if there are many obstacles in the way of guaranteeing great learning transfer, educators understand that their first priority must be the needs and development of their students, not only their academic performance. (Agayon, Agayon & Pentang, 2022).

3.2 Relevant Instructional Materials

The second primary theme focuses on the importance of instructional materials, with many participants emphasizing the significance of Self Learning Modules (SLM) in teaching Science during the new normal. SLMs emerged as the required reading material for distance learning, reflecting findings from Lopez et al. (2021) that highlight SLMs as one of the best practices during this period, despite challenges encountered by teachers and learners in utilizing online learning modalities. The relevance of instructional materials also extends to the adherence and utilization of SLMs from various levels of the Department of Education, in line with DepEd Memo No. 18, s.2020, which provides Policy Guidelines for the Provision of Learning Resources in the Implementation of Basic Education Learning Continuity Plan. Furthermore, the contextualization of SLMs was emphasized, indicating efforts by teachers to meet the needs and context of learners. This aligns with findings from Coros (2022), where senior high school students expressed satisfaction with modular distance learning, particularly noting the enhancement and integration of contextualized activities within modules.

3.3 Integration of Multimedia and Technology

The third primary theme explored the integration of multimedia and technology in teaching Science during the new normal, with a consensus among participants on its importance. This aligns with findings from Christian et al. (2021), who noted the global adaptation of technology in education due to the COVID-19 pandemic, emphasizing its advantages in incorporating diverse learning styles and enhancing information retention. The shift to the new normal prompted educational leaders to reconsider technology integration, leading to the formulation of new policies and practices suited for post-pandemic scenarios.

Furthermore, the integration of multimedia and technology was facilitated by selecting appropriate tools and applications, echoing the proposition of Murod et al. (2021) on the creation of electronic-based multimedia technologies for educational advancement. Locally, Matias & Agapito Jr. (2022) observed that multimedia presentations in schools enhanced student creativity and motivation, with students reporting improved focus during multimedia-based learning activities.

Using popular social media platforms is another new facet of multimedia and technology integration in science education. This is supported by Manalo, Reyes & Bundalian's (2022) study on online learning during the pandemic, which found that students rated self-directed learning, learning outcomes, convenience, and accessibility positively when using social media platforms for classes. However, it is crucial for educators to choose the appropriate social media platform considering its impact on student engagement and learning outcomes.

To sum it up, the strategic integration of multimedia and technology in teaching Science offers opportunities for enhanced learning experiences. By leveraging these tools effectively, educators can harness the inherent interest of students in social media towards meaningful educational engagements, promoting both academic growth and social media literacy advocacy within the educational setting.

3.4 Evaluation Based on Learning Competencies

The fourth essential subject in educating Science amid the unused ordinary was assessment based on learning competencies. With the condensation of learning competencies to the foremost basic ones, competency-based evaluation got to be significant but required adjustment to the balanced competencies. The shift from traditional classroom-based assessments to online or modular alternatives presented challenges for teachers. This theme also involved aligning assessment strategies with learning competencies, as highlighted in Hill's (2021) study where students preferred online learning and appreciated feedback from teachers. Moreover, evaluation based on learning competencies emphasized performance and output-based assessment methods, aligning with the development of 21st-century skills in science education (Mdlalose, Ramaila, & Ramnarain, 2022). VanTassel-Baska (2021) emphasized the need for creative design in performance assessment, stressing the importance of realistic testing constraints and scoring rubrics that accurately reflect the traits being evaluated. Therefore, evaluation based on learning competencies requires aligned assessment tools and strategies, along with performance and output-based assessment methods, to effectively measure learning outcomes within learners' contexts and environments.

4 Conclusions

These results lead to the following conclusions:

1. In the new normal, teaching science calls for flexible methods that take into account the students' requirements and the setting.
2. The vast experiences of educators are full of frameworks and ideas that directly address the difficulties brought on by the pandemic.
3. Resilience and mitigation require being prepared for the worst-case situation, which forces a change in accepted practices.

5 Recommendations

The following are suggested based on the research proceedings:

1. Curriculum planners and school administrators should consider teachers' real experiences to develop and implement relevant programs for both students and educators during the new normal.
2. Science teachers need to intensify their efforts and promote collaborative teaching based on research evidence and alignment with current teaching trends.
3. Future researchers are urged to conduct quantitative studies on similar topics to enhance the validity and reliability of the study findings.

6 Authors' Contributions

Dr. Analiza B. Tanghal made significant contributions to several aspects of this research, including its conception, execution, data analysis, and manuscript preparation.

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