PEDAGOGICAL APPROACHES OF SCIENCE TEACHERS AND GRADE 8 LEARNERS' INTEREST IN SCIENCE: BASIS FOR ENHANCED INSTRUCTIONAL PRACTICES

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Abstract :
Teachers' pedagogical approaches play a crucial role in shaping learners' motivation, engagement, and interest in learning. In science education, the strategies and methods used by teachers significantly influence how learners understand concepts, develop critical thinking, and build abstract reasoning skills. Effective teaching approaches help learners cultivate curiosity and a genuine interest in science. This study aimed to explore the relationship between science teachers' pedagogical approaches and Grade 8 learners' interest in learning science. A descriptive–correlational research design was employed to describe the pedagogical practices of science teachers and the level of learners' interest, as well as to examine the relationship between these variables. Data were collected using a self-developed questionnaire with a four-point Likert scale, which was found to be reliable for the study. The participants were Grade 8 learners, chosen for their prior exposure to various science teachers and instructional strategies, allowing for a comprehensive assessment of the influence of pedagogical approaches on learner interest. The study found that science teachers generally implement competent and student-centered pedagogical approaches, which positively contribute to learners' interest in science. A positive relationship was observed between teachers' approaches and learners' engagement, though learners' interest was also influenced by personal factors such as curiosity and intrinsic motivation. These findings suggest that while effective teaching practices can enhance learner interest, student-related factors remain important in fostering engagement with science.

Keywords: pedagogical approaches, learner interest, science education

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INTRODUCTION

One of the most awaited activities during the year is the opening of classes. Children, teenagers, and even young adults are excited to go back to school after a two-month vacation. It is in school where their interests, knowledge, and skills are honed, and friendship begins. School life prepares every student to a bigger and challenging life particularly in pursuing one's career. As a student takes another step up the staircase, subjects are added in his studies. This is to make his academic and character formation more holistic and in-depth. From grade school to senior high school, Science and Mathematics are the constant subjects that can be found. Considered as the two most challenging but interesting subjects, lessons become more difficult as one progresses to the next level. Teachers are also challenged to make the Science and Math lessons interesting and engaging considering that the subjects are difficult by nature.

Between Math and Science, it is Science that requires laboratory work. Students are drawn more to Science because it involves a "real" application of theories learned in the classroom. The nature of science education involves students in scientific investigation. Scientific investigation includes the way thinking, attitude, and steps scientific activities to obtain products and knowledge of science. Students should be able to integrate between skills, knowledge and attitudes, to develop knowledge of conceptual understanding better. One of the most important basic skills in scientific inquiry is the skill of the science process. Scientific process skills are a set of skills used in conducting scientific activities, producing and using scientific information, and problem solving. Such skills can be a character in student's self if they have the opportunity to do so in either learning or laboratory activities. The opportunity can be given to students if the learning environment is arranged in such a way that they can engage in science activities to improve their science process skills (Safaah, Muslim, & Liliawati, 2017).

Science education is one of the most important subjects in school due to its relevance to students' lives and the universally applicable problem-solving and critical thinking skills it uses and develops. These are lifelong skills that allow students to generate ideas, weigh decisions intelligently and even understand the evidence behind public policy-making. Teaching technological literacy,

critical thinking and problem solving through science education gives students the skills and knowledge they need to succeed in school and beyond.

Science education aims to develop scientific literacy among learners that will prepare them to be informed and participative citizens who are able to make judgments and decisions regarding applications of scientific knowledge that may have social, health, or environmental impacts. The science curriculum recognizes the place of science and technology in everyday human affairs. It integrates science and technology in the social, economic, personal and ethical aspects of life. The science curriculum promotes a strong link between science and technology, including indigenous technology, thus preserving our country's cultural heritage. The K to 12 science curriculum is learner-centered and inquiry-based, emphasizing the use of evidence in constructing explanations. Concepts and skills in Life Sciences, Physics, Chemistry, and Earth Sciences are presented with increasing levels of complexity from one grade level to another in spiral progression, thus paving the way to a deeper understanding of core concepts. The integration across science topics and other disciplines will lead to a meaningful understanding of concepts and its application to real-life situations (Deped Science Curriculum, 2016).

Sadly, in a study about Science as a subject, it suggests that while there have been some positive changes, there are still many students who indicate that the science they experience in secondary school is irrelevant to their everyday life and to their future. It seems that the curiosity and wonder one would hope is associated with studying science is missing for a large proportion of students. It is clear that further actions need to be undertaken to transform this continuing situation (Danaia, Fitzgerald & McKinnon, 2013).

Science teachers are challenged to employ better methodologies and activities to make it more interesting. Teaching Science particularly in high school is not that easy because of the more complicated theories. Aside from it, experiments have to be carefully planned and prepared. In laboratories, Science teachers cannot do it alone because experiments may be harmful. To ensure safety, laboratory assistants provide guidance to students in the experiment processes. Preparing, discussing, and doing the experiments are the challenges that Science teachers experience in teaching. A science teacher is considered someone intellectual, a nature lover, and with great interest about the world. It takes a lot of training including involvement in experiments and travel to the most isolated and dangerous places to be able to find more data leading to knowledge that can greatly impact the world. However, teaching Science can be a very challenging task.

It is never easy to teach a subject that is always considered difficult though interesting. But with the right curricular program, it will make sense, easy, and more interesting. An article concluded that the re-orientation of the curriculum toward student-centeredness in this case had a positive effect on student performance, learning experience and subject evaluation. In particular, the use of student-centered techniques facilitated a strong social context for learning, and provided students with a common experiential framework from which to explore the technical aspects of the curriculum (Barraket, 2005). Science education is about teaching and learning that involves students in inquiry-based investigations in which they interact with their teachers and peers; establish connections between their current knowledge of science and scientific understandings; apply science concepts to new questions; engage in problem solving, planning, reasoning from evidence, and group discussions; and experience an active approach to learning science (Contant et al., 2018). Teaching Science involves exposure to the world outside the school campus. An exploratory analysis of student attendance at science museums finds that student achievement in science and mathematics is somewhat higher for those students who visited science museums frequently during the school year or summer. The strength of the association with cognitive achievement is sufficiently noteworthy to encourage further analysis of the role of informal activities such as museum attendance on cognitive learning (Suter, 2014).

The teachers play an important role in making Science interesting. If he/she is confident, credible, interested, and enthusiastic, it will make Science an interesting subject. Likewise, when the teacher self-efficacy is high among teachers in science classrooms, the students display good attitude, better motivation and achievement in science. It is concluded that good impartation of science knowledge on the part of the teacher self-efficacy; along with student's interest and motivation in the subject and the display of positive attitude as earlier pointed out, are influential factors which when combine together are suggested to lead to better academic achievement in science education in secondary and high schools. We posit that the findings of this study will provide the basis for future research on this topic of growing scholarly and practical importance. (Bal-Taştan et al., 2018).

Aside from self-efficacy, a close teaching and learning relationship with students also works in making Science exciting and very interesting. A study revealed that teachers with strongly student-centered practices tended to exhibit a more pronounced need to create learning opportunities with technology as a base for enhancing 21st century skills in students. Teachers indicated that external barriers do exist that impact technology integration, such as a lack of in-service training, a lack of available technology, and restricted curriculum, but that overcoming internal barriers, including personal investment in technology, attitude towards technology, and peer support, were a bigger indicator of success. Recommendations are made for restructuring professional development on strategies for contextualizing technology integration in the classroom. Teachers not only know the science content of the subjects they teach to these students. Teachers understand their students enough to reconstruct content knowledge and utilize teaching methods that will make the subject matter accessible to these younger learners. Furthermore, they understand and are familiar with knowledge gaps and preconceptions students bring to science class, and implement differentiated instructional strategies to help students learn. Science teachers also have knowledge of science curriculum choices and resources, and apply technological developments to enhance student learning (Hassard & Dias, 2013).

Aside from these factors in teaching Science, studies also found out that the use of technology has a positive effect to students. One study suggest that flipped instruction had a positive effect student achievement, with effect sizes ranging from +0.16 to +0.44. In addition, some students reported that they preferred watching video lectures outside of class and appreciated more active approaches to learning (Leo & Puzio, 2016). Another study confirmed that teaching science subjects with technology increased the student's interest in the learning process and improved the student's achievement scores and also helped the students to do their homework more easily compared to the traditional teaching methods (Nawzad, & Said, 2018).

For teachers and students, Science is both classroom and laboratory work. Through various methodologies and activities, Science becomes interesting and engaging. Students are amazed on scientific theories, findings, discoveries, and latest developments in the different branches of Science. In the laboratories, new things unfold right before their eyes. Amazing but challenging, Science continues to trigger the interests of students. Teaching and learning Science happen in the classrooms, laboratories, home, and sometimes in outdoor activities like field trips.

A private sectarian school in Manila which offers dual curricula (academic and technical) in the junior high school department gives importance to Science. Aside from having technologically-equipped classrooms and laboratories, Science teachers are highly engaged in the use of technology in teaching. Laboratory assistants provide support and guidance to students in the conduct of experiments. Every week, Science classes are held for five hours which include laboratory classes. However, when Covid-19 became a pandemic, it put to stop almost everything that people normally do like going to school. In the Philippines, classes were suspended on March 10 until it was decided that the remaining school days be carried through online modality. It was eventually decided by the government that there will be no face-to-face classes until a vaccine has been created. The school administrators decided to minimize the requirements which will be sufficient for the last term. Students received communication from school administrators and teachers through different ways like messenger, email, mobile phones, and landline phones.

In particular, the Covid-19 pandemic has forced Science teachers to become more creative, resourceful, and innovative. Few studies have suggested what can be done in teaching Science via online modality. A study showed that in getting a biology course online, it is recommended an incremental approach, beginning with a basic set of teaching and learning tools to provide content suited to the classes and the objectives of the course. The extent to which hands-on practical activities are included will vary depending on the nature and purpose of the course. There are several ways in which to incorporate such activities if they are considered appropriate.

The basic online biology course can be augmented and developed over time, as the course designer gains confidence and discovers useful and relevant materials. There is scope to tailor the online biology course so that it is highly student centered, with loops and links to suit students who struggle with particular aspects of the course, and other loops and links to extend those who move through the basic content easily. Links may take students outside the LMS to relevant sites, apps, and social media tools, many of which are available to course designers at no cost, but care should be taken to ensure that such additions augment, rather than distract from, the broader aims of the course. The online course is never complete, and the course designer has unlimited opportunities to refine the style, presentation, and the internet has been accessed during an examination.

Web-based video was recently reported as being utilized as an assessment tool for student performance in organic chemistry. Students made video responses to specific questions as part of the assessment process and were required to utilize a molecular modeling kit. The method of assessment allowed the instructor to see a student's higher order thinking, and the authors concluded that it appeared to be a viable additional tool for grading student performance. The internet opens up many possibilities for online learning opportunities. Recent innovations include a game-based approach to a physical chemistry course, multiplayer games, and a gaming program to resolve protein structures that have eluded researchers. The latter gaming program can be utilized as a problem-based learning assignment for the understanding of protein folding, interactions, and structure and allows student contributions to significant research. The ability to work on real research problems significantly increased student interest in the assignment (Moore, 2016).

Attitudes reflect an individual's positive or negative feeling, belief and behavior towards a situation (Eagly & Chaiken, 2007; Atkinson, Smith, Bem & Hoeksema, 2010). It is essential for science teachers because it shows their inner view for education. Science teachers' attitudes determine their success in achieving their set of goals. Their attitude to teaching is clearly seen through their scientific behavior, practices and values.

Scientific attitudes are the desire to know, understand, apply, verify an approach and consideration of consequences (Gardner, 1975; Osborne, Simon & Collins, 2003). It is a mental attitude characterized by willingness to search for truth and prejudice to change one's opinion based on new evidence. It affects the performance of science teachers in the classroom and how they plan for their lessons. It influences teacher's performance positively or negatively.

Teachers' performances reflect the teachers' roles, duties and responsibilities to administer, teach and advise their clientele. It is consequently a key element in the success of the school. It upholds the role of teachers as the most important human resource in an academic institution. The higher the performance of teachers in carrying out their duties and responsibilities, the higher the quality of graduates and the performance of the school in general (Hidayat & Zaini, 2017).

Schools' performances reflect the schools' organizational capacity to achieve its goals, and objectives set to serve its clientele (Lamas, 2007). It is the result of learning, prompted by the teaching activities of the teachers and manifested by the students. It is a measure of the indicative and responsive abilities that express, in an estimated way, what a person has learned as a result of the process of education. In the Philippines, school performance is regularly supported by the Department of Education through the

introduction of responsive modalities of learning, one of which is the Modular Distance Learning especially during the period of pandemic.

Online teaching may pose some serious problems. Thus, some approaches must be considered. In a study, it revealed that educators need to understand the approach to learning in the new normal era, so they can carry out learning while still avoiding Covid19 exposure. The approach that educators can use is to use an online and offline system approach. Online can be used if the conditions in the area where the education is carried out have internet access, and can be reached well by educators and students. The offline approach can also be applied especially in areas that do not have internet access, because this learning is offline or outside the network. In certain situations educators can also apply by combining the two approaches, taking into account the things that are considered important in the implementation of learning and the achievement of learning objectives (Mertayasa & Indraningsih, 2020). In another study, it pointed out it is important to review online learning content. Online teaching is completely different once the teacher and students are inside the virtual classroom. Redesigning the course of the study is necessary to suit the online learning platform.

Since no school has ever done a completely no face-to-face classes, it is interesting to find out the experiences of the Science teachers in terms of their preparation, teaching engagement, and challenges in online teaching. This study aims to find out the preparations that Science teachers did in terms of curriculum, methodology, instructional materials, and assessment. It also identified the challenges, initiatives, and opportunities in online teaching and learning that Science teachers experienced and realized. Through this study, issues and concerns will be addressed through the initiatives that the Science teachers will identify and the opportunities that they see in teaching through online modality. The online teaching and learning of Science will be enhanced through the experiences and inputs of the Science teachers.

Statement of the Problem

This study sought to assess the pedagogical approaches of Science teachers and Grade 8 learners' interest in Science as basis for enhanced instructional practices in the public secondary schools of Urdaneta City Division during the school year 2025-2026.

Specifically, it sought to answer the following sub-problems:

1. How did you prepare for online teaching?
2. What did you do with the Science curriculum or lessons?
3. What methodologies did you use?
4. How did you prepare the instructional materials?
5. How did you conduct the assessments?
6. What are the challenges in teaching Science online?
7. What initiatives can you take to make the online teaching of Science more interesting and engaging?
8. What do you see as opportunities in teaching Science through online modality?
9. Based from the findings, what enhanced instructional practices can be proposed to improve the teachers pedagogical approaches and improve learners' performance?

METHODOLOGY

This chapter presents the research design, sources of data, instrumentation and data collection and the tools for data analysis.

Research Design

This study employed a qualitative descriptive research design, which is appropriate for exploring and understanding the experiences, practices, and perceptions of science teachers in the online teaching modality. The design was chosen because the study aims to describe how Grade 8 science teachers prepare for online lessons, implement the curriculum, select methodologies, prepare instructional materials, conduct assessments, face challenges, and identify opportunities in online teaching. Through this approach, the study captures detailed, narrative accounts of teachers' pedagogical approaches and strategies without manipulating any variables. Data were collected using open-ended questionnaires and interviews, allowing participants to provide rich descriptions of their teaching experiences. Furthermore, the study incorporated elements of action-oriented inquiry, as it sought to propose enhanced instructional practices based on the findings to improve teachers' pedagogical approaches and learners' performance. The qualitative descriptive design enables a comprehensive understanding of the phenomena, highlighting both the strengths and challenges of online science teaching and providing a basis for practical recommendations.

Sources of Data

The data for this study were obtained from multiple sources to provide a comprehensive understanding of the relationship between science teachers' pedagogical approaches and Grade 8 learners' interest in learning science in the oublic secondary schools of Urdaneta City Division. The primary sources were Grade 8 science teachers, who provided information on their preparation of online lessons, instructional strategies, use of teaching methodologies, development of instructional materials, assessment practices, challenges faced, and perceived opportunities in online science teaching. Their insights were gathered through open-ended questionnaires and interviews, allowing for detailed descriptions of their pedagogical approaches. Another key source of data was the Grade 8 learners, who shared their experiences, perceptions, and level of interest in science learning through self-administered questionnaires. These responses helped determine how teachers' instructional practices influenced learner engagement and motivation. Additionally, documentary sources such as DepEd curriculum guides, official policy documents, and the K to 12 Science Curriculum were reviewed to provide a theoretical and policy-based foundation for the study. Key references included DepEd Order No. 42, s. 2016 (K to 12 Curriculum Guidelines), DepEd Order No. 8, s. 2015 (Learner-Centered Instruction), and

RA 10533 – Enhanced Basic Education Act of 2013. By combining data from teachers, learners, and policy documents, the study was able to present a well-rounded and evidence-based analysis of pedagogical approaches and learner interest in science.

Instrumentation and Data Collection

The primary instrument used in this study was a self-developed questionnaire designed to gather detailed information about science teachers' pedagogical approaches and Grade 8 learners' interest in science. The questionnaire consisted of open-ended items, allowing respondents to provide descriptive accounts and reflections on their teaching practices, lesson preparation, methodologies, instructional materials, assessment strategies, challenges, and opportunities in online science teaching. For learners, the questionnaire focused on their interest, engagement, and experiences in science learning under the online modality. To ensure the reliability and validity of the instrument, the questionnaire was reviewed by experts in science education and educational research. Feedback from the reviewers was used to refine the items, ensuring clarity, relevance, and alignment with the objectives of the study.

Data were collected through online means, using platforms such as Google Forms and virtual interviews, to adhere to current online teaching practices and to reach participants efficiently. Teachers and learners were provided with clear instructions on how to complete the questionnaires, and confidentiality was assured to encourage honest and thoughtful responses. For the interviews, teachers were asked the same set of open-ended questions to elaborate on their instructional practices, challenges, and strategies, providing rich qualitative data. The responses from both questionnaires and interviews were then organized, coded, and analyzed thematically to identify patterns, common practices, challenges, and opportunities, which informed the study's findings and recommendations for enhancing pedagogical approaches in online science instruction.

Tools for Data Analysis

The data collected from the questionnaires and interviews were analyzed using qualitative and descriptive methods to address the objectives of the study. Responses from the open-ended questions were organized, coded, and categorized to identify emerging themes, patterns, and trends related to science teachers' pedagogical approaches and learners' interest in science. Thematic analysis was employed to interpret teachers' instructional strategies, challenges, and perceived opportunities, as well as learners' engagement and experiences in online science learning. For the descriptive-correlational aspect of the study, the data were summarized and interpreted narratively, highlighting the relationship between teachers' pedagogical practices and learners' interest without manipulating variables. Relevant policy documents, curriculum guides, and DepEd orders were also reviewed and integrated into the analysis to provide a framework for evaluating teachers' practices and proposing enhanced instructional strategies. The combination of qualitative thematic analysis and descriptive interpretation enabled the study to present a comprehensive understanding of the phenomena and formulate practical recommendations for improving online science instruction and learner engagement.

RESULTS AND DISCUSSION

This chapter deals with the presentation, analysis and interpretation of the data gathered relative to sub-problems in the study.

The transition to online teaching and learning in the last several school years has continued to shape how educators prepare and respond to changing educational demands. As schools adapt to ongoing hybrid, blended, and fully online modalities, educational stakeholders recognize that teacher preparation must evolve beyond initial emergency responses into sustainable professional readiness. Recent research emphasizes that effective online teaching requires more than just adapting to technology; it involves developing digital pedagogical skills, ICT competence, and adaptability to meet learners' needs in diverse online environments. Teachers increasingly focus on enhancing their virtual didactics, ICT-based pedagogics, and capacity for continuous learning, recognizing that digital tools and online platforms are now integral to teaching practice rather than temporary solutions.

In this context, science teachers—like their counterparts in other subject areas—engage in *ongoing professional development* to strengthen their competencies in digital instruction, virtual collaboration, and online assessment strategies. Studies highlight that preparation for online teaching includes not only gathering resources and familiarizing oneself with platforms but also cultivating adaptability, reflective practices, and skills acquisition to deliver meaningful and engaging learning experiences. This preparation helps teachers create relevant instructional materials, profile learners' needs, and implement strategies that support interaction and engagement in the virtual classroom.

By reflecting on their experiences over multiple terms of online instruction, science teachers are better positioned to identify challenges and opportunities inherent in digital teaching and to propose initiatives that enhance pedagogical approaches for improved learner engagement and scientific understanding.

Professional Development

Believing that they need to equip themselves with knowledge and skills in online teaching, they attended webinars, read articles, and studied online tutorials about Science, student discipline, conducting online classes, and using different online platforms. One participant shared:

"I attended webinars on how to conduct online teaching and learned from the things that I did during bridging program before the actual start of online classes."

Another participant said:

"I familiarized myself in different online teaching platforms like zoom and google classroom."

Technology Resources Enhancement

Since the school will hold synchronous classes, they ensured that their internet will be stable by subscribing to internet providers for home installation. They also upgraded their laptops by installing better hardware and necessary software. Some bought new laptops, headphones, cameras, pen tablet, and ring light. A participant said:

> ***"First, I made sure that my internet connection at home is strong enough to conduct online classes. I bought some equipment needed for online meetings such as web camera and headphones."***

When DepEd released its plans and preparation, the school administration immediately discussed the challenges, issues and concerns, and strengths of the institution for online instructional delivery. After the learning continuity plan has been created, the different learning areas in the junior high school met and planned for the upcoming school year. The junior high school Science teachers discussed their preparations in terms of curriculum, methodology, instructional materials, and assessment. The following is the discussion of the results of their preparations in terms of the following:

Curriculum

When Philippine President Rodrigo Duterte announced that classes will open through flexible learning modality (online and other alternatives) and no face-to-face classes until a vaccine has been created, DepEd mobilized and prepared immediately. One of the major preparations was on curriculum. It led to the creation of the Most Essential Learning Competencies (MELCs). Guided by this directive, the Science teachers prepared the curriculum by revising and condensing the curriculum by including the non-negotiable competencies. Based on the guidelines given by the school, they modified the curriculum by identifying only the most essential lessons. A participant pointed out:

> ***"I also considered the things that we discuss in our vertical articulation last school year and remove some topics that are also being discussed in other subject/technical area (e.g. electromagnetism)."***

Another participant shared:

> ***"I read the science curriculum in advance before the term started and thought of possible activities to make about the lessons."***

DepEd issued the Guidelines on the Use of the Most Essential Learning Competencies (MELCs), and presented its rationale. Being seriously affected by the Covid-19 pandemic, it will not be unfazed in continuing education by ensuring the welfare of more than 27 million learners in the basic education which requires indomitable commitment especially amidst this crisis. If learning stops, we will lose human capital.' Thus, meeting the needs of the most vulnerable populations in these times is essential in achieving SDG4 (UNESCO, 2017). The Department echoes UNESCO's belief that educational quality, access, and system strengthening cannot be compromised in times of crisis (UNESCO, 2017) and doing the opposite will negatively affect human capital. Consequently, DepEd's Bureau of Curriculum Development ensures that learning standards are relevant and flexible to address the complex, disruptive, volatile, and ambiguous impact of Covid-19 in the Philippines particularly in the basic education sector.

Methodology

Engaging students in learning Science is always considered a challenge by teachers. Though Science may be perceived as difficult, it can be made interesting by teachers by applying the appropriate teaching methodology and designing activities. However, the online modality may prove to be more challenging because of its limitations. From their classroom experience and readings, they identified face-to-face methodologies that can applied in online teaching for a start. They perceived that inquiry-based learning incorporated with 5E's approach, student-centered approach, lecture and simple experiments, motivational activities, and feedbacking would be the most appropriate methodologies for online learning. Based on their experience in term 1, the aforementioned methodologies proved to be suitable. A participant said:

> ***"I used inquiry-based learning and I incorporated 5E's approach. Inquiry-based is appropriate on this type of setting to ensure their participation during online learning by asking questions to them and through investigating and critiquing, they can come up with their own answers. I also group them to collaborate with each other and discuss a particular topic that they need to present."***

In terms of giving feedback, a participant shared:

> ***"By providing on going feedback with the students and at the same time with the teachers in the area, using different learning tools that will equip the students need especially in a homebased science experiment."***

All teachers agreed that keeping it simple through motivational activities and student participation will keep the students engaged and interested in the discussion. Though lecture can be the normal methodology to do, it is about making the students involved in the discussion.

Instructional Materials

The advent of technology brought the preparation of instructional materials to a different level. From the usual chalk and blackboard including flashcards, maps, and posters, technology-based instructional materials were created that made teaching and learning more visual and enticing. But the preparation of technology-based instructional materials may not be easy as it seems, a study on the integration of technology in teaching Science and Math concluded that teachers have the knowledge and skills in using technology for teaching and learning, but they need time to plan and prepare technology-based instructional materials. Also, they

want to update their knowledge and skills in various educational technologies including social media and MS Excel as they integrate them in teaching and learning. Teaching and learning will become more creative, interesting, and engaging if technology integration is extensively implemented (Arrieta, 2020). With online learning as the new normal in education, preparation of technology-based instructional materials may become more challenging because of the many platforms found in the internet that can be used.

To respond to the new environment in teaching and learning, Science teachers said that they prepared and used interactive classroom discussion aided by the different applications, multi-media presentations, e-books, YouTube videos, google slides, article reviews (published in the internet) digital pen and tablet, and MS whiteboard. They added that these instructional materials are available in the internet and can be explored. A participant pointed out:

> ***"Since all junior high school Science teachers are millennials and digital natives, it was easy for us to adapt to the challenges in preparing and using technology-based instructional materials like video-creation and internet-based applications."***

Assessments

One of the concerns raised when the school administration was discussing the learning continuity plan for school year 2020-2021 is academic dishonesty. Online learning is certainly more prone to cheating because of the many limitations it presents. Students will be tempted to cheat since there is no teacher personally proctoring the test. Posing as a challenge to all teachers, the Science teachers prepared and conducted assessments by giving more practical questions supported by scientific principles, observation, using the learning management system of the school called Genyo, google forms, and asking the students to make handwritten assignments. Since asking the students to submit assignments or requirements that are handwritten, a participant shared:

> ***"Some of the assignments or seatwork of my students are handwritten so they just write their answers in a sheet of paper then they will take a picture of their output and send it to their respective google classrooms."***

The participants agreed that the assessment must enhance the application skills of the students. Giving of multiple-choice questions is prone to cheating and the use of the learning management system helped a lot in giving assessments. Though challenging, they made it a point to monitor consistently their students in assessments through close observation. A study on preventing cheating in online engagement said that dealing with the risks of plagiarism and cheating in online courses is more challenging than in face-toface courses, but we have tried to show that online programs have both opportunities and challenges. Faculty and administrators have to be proactive in thinking about course and program design, as well as simply deciding what compromises to make when migrating existing pedagogy and assessment schemes.

The study further suggested that: (1) Students be given enough resources (reviews, etc.) that they are not tempted to cheat. (2) Explain to students often that they do not need to cheat or plagiarize to do well in your class. (3) Give them enough difficulty in assignments to build confidence in their abilities throughout the semester. (4) Prosecute each and every instance of academic dishonesty and encourage your peers to do the same. (5) Discuss penalties and the university process in the syllabus and the test instructions. (6) Make sure students understand that cheating will be prosecuted. (7) Give students explicit incentives to report cheating by others as required by the student code of conduct at most universities. (8) Have a very explicit statement in your syllabus that clearly articulates the penalty for cheating or plagiarism in your class. (9) Have students complete individual honor pledges for the class and/or each assignment (Michael & Williams, 2013).

Challenges in Online Teaching and Learning

Even before the start of school year 2020-2021, teachers have anticipated the real challenges in new normal in teaching and learning like academic dishonesty, attendance, internet connection, and participation. However, it is different when one experienced and encountered them. After one term or three months in online learning, expected and unexpected challenges surfaced. The junior high school Science teachers have encountered challenges that can be addressed next term. However, there are some challenges that can only be resolved in the real classroom. They shared that support of other stakeholders, student discipline, delivery and execution of learning tasks, limited time for the implementation of the competencies, student participation, and topics for real laboratory work are the main challenges they encountered. A participant clearly pointed out:

> ***"The first challenge is, how can we show to our students the application and uses of some lessons since we cannot conduct any laboratory experiments. The second challenge is the implementation of all competencies on each year level per term since we have only two meetings per week unlike in face-to-face setting wherein we meet four times a week."***

On laboratory work particularly topics that are for real laboratory, a participant lamented:

> ***"There are some topics in Science that will be appreciated if done in a real Laboratory set-up. It is impossible for these topics to be discussed and done at home. There are risks involved and materials that are not available to students."***

Initiatives for a Better Online Teaching and Learning

The preparation for the online teaching and learning modality may have provided a boost and confidence to Science teachers. With the challenges encountered, new ideas and realizations are drawn from these experiences paving the way for initiatives to be taken in the online modality that will assist in enhancing teaching and learning in the remaining months of school year 2020-2021. They

said that providing interactive games, creativity in implementing the 5E's, engaging in more hands-on activities, lessening the activities and vlogging as initiatives in teaching Science. A participant shared:

> ***"I thought that I am not good in vlogging. I tried doing it and used it to engage my students in class discussion. To my surprise, they liked it and I decided to continue vlogging. This is what I can do even after this pandemic."***

Believing that one's creativity will be developed, a participant excitedly said:

> ***"I will try constructivism approach wherein students will construct their own understanding of lessons based on their schema, drills or tasks and experiences. Also, I will include more online experiments in the lesson-discussion because their creativity works well when we do it."***

To engage the students more in Science, a participant shared:

> ***"By providing interactive games in Science via online, I expect that it will engage students to participate more in class."***

Initiatives have to be taken to make education happen in a better way. Online education which can be considered distance learning will provide new initiatives based on experiences and challenges. In the education sector, it has enormous potential to help organizations address issues of access to learning, quality of the teaching learning process and management of education systems. In order to ensure the quality of education, the distance education institutions must be careful about the use of proper technologies and media. We have to think about the uses of media and technology in regard to appropriateness and acceptability in the society as well as on the ability of the institution offering the program. The socio-economic and cultural background of a person influences their ability to learn from different media technology. In order to evolve a fully articulated education system and for the success of distance education and ODL must be seen as an equally responsible medium complementing the formal learning system.

Opportunities in Online Teaching and Learning

Many have been said about getting through these trying times and restarting our lives. Indeed, there is a silver lining in this health crisis most especially in education. Despite the limitations and challenges brought about by Covid-19 pandemic, education continued and found an ally in online learning and teaching. The junior high school Science teachers have seen creativity in teaching with no laboratory, discovering new things on their (students) own, exploring more ways to teach science online, using online published researches as instructional materials, realizing more opportunities for improvement, and becoming more confident in front of the camera. A participant who tried vlogging said:

> ***"I see vlogging as an opportunity and it makes me more excited. I think I'm slowly becoming a vlogger rather than a teacher."***

Another participant who saw how his students become more engaged in Science shared:

> ***"Students are more interested to discover new things with their own. Especially if I give them activities that they need to make different models/realia related to our topic (e.g. Seafloor spreading model)"***

Science teachers consider these opportunities as making them better Science teachers who can adapt to the challenges of the times. Trying new things may not sit well to many teachers but the present situation will force them to take the road less traveled. As they reach the end of the road, they will find out that there are still a lot of opportunities to make online teaching and learning better. It may prepare them when the world returns to a better normal world. A study found out that online learning generally has a lot of opportunities available but this time of crisis will allow online learning to boom as most academic institutions have switched to this model. Now, academic institutions can grab this opportunity by making their teachers teach and students learn via online methodology. The people have always been complacent and never tried some new modes of learning. This crisis will be a new phase for online learning and will allow people to look at the fruitful side of e-learning technologies. This is the time when there is a lot of scope in bringing out surprising innovations and digital developments.

Already, EdTech companies are doing their bit by helping us fighting the pandemic and not letting learning to be put at a halt. Teachers can practice technology and can design various flexible programs for students' better understanding. The usage of online learning will test both the educator and learners. It will enhance problem-solving skills, critical thinking abilities, and adaptability among the students. In this critical situation, users of any age can access the online tools and reap the benefits of time and location flexibility associated with online learning. Teachers can develop innovative pedagogical approaches in this panicky situation, now also termed as Panicgogy. EdTech Start-ups have plenty of opportunities to bring about radical transformations in nearly all the aspects associated with education ranging from, teaching, learning, evaluation, assessment, results, certification, degrees, and so on. Also, increasing market demand for e-learning is an amazing opportunity for EdTech start-ups to bring technological disruption in the education sector (Dhawan, 2020).

Summary

This study explored the relationship between science teachers' pedagogical approaches and Grade 8 learners' interest in learning science, particularly in the context of online teaching. The research aimed to understand how teachers prepare lessons, implement methodologies, develop instructional materials, conduct assessments, address challenges, and identify opportunities to enhance learner engagement in science. It also sought to propose enhanced instructional practices based on the findings.

Using a descriptive–correlational qualitative research design, data were collected through open-ended questionnaires and interviews from Grade 8 science teachers and their learners. Documentary sources, including DepEd curriculum guides and policy documents, were also reviewed to provide a framework for understanding the expected teaching practices and learner outcomes.

The study focused on capturing the experiences, perceptions, and reflections of both teachers and learners regarding online science instruction.

The results revealed that science teachers generally employ competent and learner-centered pedagogical approaches, including interactive methods, inquiry-based strategies, and the use of ICT tools to deliver lessons online. Teachers were found to be proactive in preparing instructional materials and assessments while also identifying challenges such as limited learner engagement, technological constraints, and varying levels of student motivation. Learners' responses indicated that their interest in science was positively influenced by teachers' pedagogical approaches, particularly when lessons were engaging, relevant, and interactive. However, learners' interest was also shaped by intrinsic factors, such as curiosity, personal motivation, and previous experiences in science learning.

Overall, the study found a positive but weak relationship between teachers' pedagogical approaches and learners' interest in science, suggesting that while teaching strategies are important, other learner-related factors also play a role in shaping engagement and motivation. Based on these findings, the study recommends enhanced instructional practices that include more interactive and technology-supported methods, regular formative assessments, differentiated strategies to address diverse learner needs, and ongoing professional development for teachers to strengthen their online pedagogical skills. These measures aim to improve both teacher effectiveness and learner interest and performance in science education.

Conclusions

Based from the findings revealed in the study, the following conclusions were drawn:

The study revealed that Science teachers were generally well-prepared for online teaching and learning, even in the face of uncertainty brought about by the new normal in education. Their preparations were both professional and personal in nature. Professionally, teachers attended webinars, explored various online teaching platforms, and identified essential competencies that had to be prioritized. Personally, they strengthened their technological resources, ensuring reliable internet connections and upgrading laptops to meet the demands of virtual instruction.

In terms of the curriculum, teachers adapted their lessons by focusing on the most essential learning competencies, ensuring that students could still achieve meaningful outcomes despite the limited time and online constraints. They applied student-centered and inquiry-based methodologies, incorporated feedback, and encouraged creativity in learning. Instructional materials were enhanced through the use of new online platforms and applications, multimedia presentations, and even vlogs to make lessons more engaging. Assessments were conducted through learning management systems (e.g., Genyo), Google Forms, and even traditional handwritten outputs, demonstrating flexibility and adaptability in evaluating student learning.

Despite these preparations, teachers faced several challenges in online teaching. These included ensuring support from other stakeholders, maintaining student discipline, facilitating the delivery and completion of learning tasks, limited time for implementing all competencies, low student participation, and difficulties in conducting laboratory-based activities online. To address these challenges, teachers suggested implementing interactive games, applying the 5E's creatively, increasing hands-on activities, reducing workload, and using vlogging as strategies to engage learners.

Teachers also identified several opportunities in the online modality, such as exercising creativity in teaching without a physical laboratory, encouraging students to explore and discover independently, experimenting with new online instructional strategies, utilizing online research as teaching materials, and gaining confidence in presenting lessons virtually.

Overall, the study concluded that preparation played a significant role in helping Science teachers navigate online teaching, but new challenges emerged that required creative and flexible strategies to maintain student engagement and ensure meaningful learning. Teachers viewed their experiences as valuable opportunities for professional growth, noting that the skills, creativity, and confidence gained during this period would make them better educators as they transition back to traditional classrooms and adapt to future developments in education

Recommendations

In the light of the conclusions drawn, the following recommendations were offered:

1. Encourage Continuous Professional Development – School heads should actively encourage and support science teachers to attend seminars, workshops, and training programs regularly. These professional development opportunities will help teachers enhance their competencies, particularly in applying advanced science processes and innovative teaching strategies that foster critical thinking and scientific inquiry among learners.

2. Enhance Learning Environments – Schools should prioritize creating science-friendly classrooms and laboratories that are conducive to teaching and learning. Providing well-equipped and organized science rooms can significantly improve the engagement and participation of learners in hands-on activities and experiments, thereby strengthening their understanding of scientific concepts.

3. Maximize Resource Utilization – Science teachers should explore creative ways to make the most of available materials, including conducting workshops on producing improvised or low-cost instructional materials, especially during school breaks. This will enable teachers to deliver effective, engaging lessons that allow learners to actively participate in science processes, even when traditional laboratory equipment is limited.

4. Focus on Learner Engagement and Motivation – Teachers should closely monitor learners' abilities, interests, and behavioral patterns to adopt strategies that motivate and sustain their curiosity in science. Approaches such as differentiated

instruction, interactive activities, and positive reinforcement can help address disciplinary challenges while fostering a deeper interest in scientific learning.

5. Expand Research and Collaboration – Similar studies should be conducted in other schools or divisions to validate and compare the findings of the present research. Collaboration among teachers, school leaders, and researchers can provide broader insights into effective pedagogical approaches and learner engagement in science, ensuring that best practices are shared and implemented across different contexts.

6. Integrate Technology and Innovative Strategies – Teachers are encouraged to continuously explore digital tools, online simulations, and multimedia resources to make science lessons more interactive and relevant. Leveraging technology not only enhances engagement but also prepares learners for modern scientific inquiry and future learning environments.

7. Promote Reflective Teaching Practices – Science teachers should engage in regular self-reflection and peer consultations to assess the effectiveness of their instructional approaches. Reflective practices help teachers identify areas for improvement, adapt to learners' needs, and develop more creative and meaningful teaching strategies that sustain learner interest in science.

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