

Evaluation of Modular Approach in Teaching Science

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Abstract

Traditional education programs have been one of the first casualties of the COVID-19 pandemic. Hence, Department of Education (DepEd) has moved to modular distance learning through printed modules. One of the difficult areas to teach in modular teaching is Science which requires laboratory work and learning science concepts.

The research design used is descriptive using quantitative data. The data was extracted via a self-made questionnaire which has been validated and distributed to 137 Science teachers in 19 Public Secondary Schools in Calamba City.

Teachers' views on the implementation of a modular approach in teaching Science are consistent in terms of content, instructional resources, pedagogical approaches, and assessment, according to the findings. They agree with the scores they provided for each variable when grouped according to profile. However, they had diverse views on the modular approach's assessment scheme when grouped based on their educational backgrounds. Among others, teachers with a doctorate degree had the lowest weighted mean. This argues that, in a modular approach, student learning assessment for teaching and learning Science should be unified and standardized.

There was no significant difference among the responses of the respondents when they are grouped according to profile. The respondents strongly agree on the success of the modular approach in terms of pedagogical approaches and instructional materials. However, they are just satisfactory in terms of content and assessment. Hence, a proposed action plan focused on content and assessment is designed to enhance teaching Science in a modular approach.

Keywords: modular; evaluation; modular approach; science teaching; distance learning

INTRODUCTION

Traditional education programs have been one of the first casualties of the global COVID-19 pandemic. Several institutions, colleges, and universities have eliminated face-to-face instruction. The need for alternate education system innovation and implementation, as well as assessment methodologies, has become critical. The pandemic has given education an opportunity to pave the path for new learning delivery methods to be used. The way educators deliver great education—through diverse modalities—is undergoing a paradigm shift. Despite the problems faced by both teachers and students, distance learning and continuing education have emerged as a remedy for this unprecedented worldwide pandemic. Transitioning from traditional face-to-face learning to remote learning, on the other hand, can be a completely different experience for both students and teachers. They must adapt since they have few or no other options.

The Department of Education (DepEd) has developed distance learning modalities, which are distinct delivery modes in which interaction happens between the teacher and students who are geographically separated from one another during teaching. This means that teachings will be delivered in a different way than the traditional face-to-face method. The most popular distance learning modalities, such as modular approach in teaching or learning through printed and digital modules, have emerged among parents with kids enlisted this school year. This additionally considers students in distant areas who don't have internet connection for online learning.

Meanwhile, science is one of the subjects that requires laboratory work. Science attracts students because it implies the "real-world" utilization of theories learnt inside the classroom. Science learning entails the learners to participate in science research studies. Scientific study entails the way people think, their attitudes, and the procedures they take to get science's output and understanding. Learners should manage to relate the abilities, information, and attitudes in order to improve their conceptual understanding. The science method is one of the most fundamental basic abilities in scientific investigation. (Safaah, Muslim, & Liliawati, 2017).

Science encompasses both classroom and laboratory activity for teachers and students. Science becomes intriguing and engaging through a variety of approaches and activities. In the laboratory, fresh discoveries are made right in front of their eyes. Science continues to catch the attention of youngsters because it is both amazing and demanding. Science is taught and learned in a variety of settings, including classrooms, laboratories, homes, and occasionally outdoor activities such as field excursions.

These facts encouraged the researcher to do this study since it is evident that performing her obligations, as well as those of other Science teachers, is difficult in this time of pandemic. Distance learning comes with a

number of drawbacks and restrictions. Experiments in science, collaborative efforts, and other useful learning tasks are no longer possible.

Thus, with all of these, the researcher intended to evaluate the Modular Approach in Teaching Science particularly in SDO Calamba City which may contribute in crafting an action plan for the enhancement of teaching science using modular approach. This study considered the demographic profile, in terms of age, sex, education and years of service, of the Science teachers in the secondary public schools under study. Moreover, the modular approach in teaching science was gauged through the variables such as content, instructional materials, pedagogical approaches and assessment. Content, in this review, relates to the assemblage of information and data that teachers instruct and those students are supposed to learn in a given time period. In this time of pandemic, this refers to the most essential learning competencies; instructional materials, on the other hand, refers to the different primary and supplementary materials given to the learners to support their independent learning; pedagogical approaches are those being used by the teachers in the delivery of instructions despite the challenges post by the distance learning. Lastly, assessment in this study alludes to the instruments in assessing students' learning in a measured methodology.

This study aimed to evaluate the Modular Approach in Teaching Science particularly in SDO Calamba City. Specifically, it aimed to present the profile of the respondents in terms of age, sex, educational attainment, years of service; assess the implementation of modular approach in teaching science in terms of Content, instructional materials, pedagogical approaches, and assessment; determine if there is a significant difference in the implementation of the modular approach when the respondents are grouped according to profile; and finally, propose an action plan for enhancement of teaching science using modular approach based on the results and findings.

LITERATURE REVIEW

Curriculum re-adjustment is concerned not just with the substance of what is to be contemplated and instructed, yet in addition with the way things are to be learn, taught, and evaluated considering the pandemic's issues. An adaptable educational plan configuration ought to be student focused, considering the segment profile and conditions of students, for example, admittance to innovation, mechanical skill levels, different learning styles and capacities, and different information foundations and encounters and guaranteeing a variety of and adaptable types of assessment (Ryan & Tilbury, 2013; Gachago et al., 2018). The challenge during a pandemic is striking a balance between students' need to learn critical core competencies and teachers' desire to achieve the curriculum's intended outcomes.

The students' association in the teaching-learning process should be perceived in the viewpoint of adaptability. It's tied in with planning and conveying significant growth opportunities so every understudy capitalizes on their time in the homeroom. In the event that up close and personal learning is preposterous because of the pandemic, teacher might utilize adaptable distance learning techniques, for example, correspondence educating, module-based learning, project-based learning, and TV broadcasting. Students with web association can concentrate on PC helped schooling, simultaneous web based learning, offbeat web based learning, and cooperative e-learning.

Modular Approach

The COVID-19 pandemic compelled the countries to limit their physical interactions which resulted to strict restrictions into the different fields and one of the most affected fields is education. Because there should be no physical interactions, traditional teaching methods are hard to execute. As a result, distance learning becomes a reality. Because of the country's restricted Internet access and poor internet connection, most schools in the Philippines adopt a modular approach to teaching. Moreover, the majority of students in the country chose a modular teaching strategy over an online approach or other alternative learning techniques (Bernardo, 2020). Researchers had positive views in implementing modular approach in teaching.

Studies were made to evaluate the performance of students in the modular approach in comparison to students in the traditional approach.

Discoveries from the investigation of Sadiq and Zamir (2014) demonstrated that secluded methodology gives a superior teachings and learning process for students since they might take care of their students at their own speed dissimilar to a regular face-to-face classes. Padmapriya (2015) added that the use of self-learning modules enables the students to study and learn on their own. In fact, students had positive reflection when they underwent a modular approach in learning science.

Furthermore, Lim (2016) compared the performance of students when they are taught using the traditional method and using instructional modules. Using t-test, significant differences were found in the post-test scores of control group and experimental group which means that using instructional modules was proven effective. Same method was used by Ambayon (2020) in assessing performance of students in their Literature subject.

Students who used modules had bigger improvements than those who did not. Paspasan (2015) compared the performance of students in structured teaching strategy and self-paced modular strategy. Students were able to work independently and develop their arithmetic skills because of the self-paced technique.

Although these studies revealed potential positive impact of modular approach to students, such learning mode needs good supervision. According to Cornford (2016), a modular approach will be effective if the modules include a mix of theoretical and practical components. This way, learning is maximized.

Modular Approach in Teaching Science

According to Vidhyalaya (2013), At the upper elementary level, science is an important subject where instructors and students benefit from a better understanding of basic science concepts. Teachers, on the other hand, have traditionally failed to grasp key scientific concepts. Besides, they battled to show some science thoughts. In the event that teachers experience issues getting a handle on these thoughts, they will be inappropriately passed down to students, bringing about a wide scope of understandings. Teachers' informative methodologies in giving the ideas and capacities that are basic in extending students' appreciation of science, as indicated by Dunlosky (2013), play a part in satisfying the objectives of science instruction. Teachers' showing approaches fundamentally affect students' capacities and potential for compelling, valid, and significant learning. The nature of guidance that students get is remembered to altogether affect their instructive results. Indeed, teachers should foster strategies to further develop learning conveyance to guarantee that students get the data they require.

Science discipline is a fundamental subjects in school in view of its significance to students' everyday lives as well as the widely pertinent critical thinking and decisive reasoning abilities which utilizes and creates. These capacities will serve students for their future, assisting them with thinking of groundbreaking thoughts, settling on informed choices, and in any event, grasping the realities that influence public policy. Science education provides children with the skills and knowledge they need to excel in school and beyond by teaching technical literacy, critical thinking, and problem-solving.

Teachers are encouraged to employ more engaging approaches and activities to make science more accessible. Due to the increasingly complex theories, science is difficult to teach, especially in high school. Experiments, on the other hand, require precise planning and execution. Because experiments can be hazardous, science teachers are unable to conduct them in laboratories alone. Laboratory assistants guide students through the experiment protocols to ensure their safety. Science teachers face obstacles in the classroom when it comes to planning, discussing, and carrying out experiments. A scientific teacher is known to be a thinker, a lover of nature, and someone who is fascinated by the world. Science, on the other hand, can be a tough subject to teach. It's never easy to teach a subject that's traditionally thought to be tough, even if it's fascinating. It will, however, make sense, be simple, and more exciting with the correct curricular approach. According to an article, reorienting the curriculum toward student-centeredness had a positive impact on student performance, learning experiences, and subject appraisal in this case. The use of student-centered strategies, in particular, helped to create a strong social context for learning and gave students a common experiential framework to explore the technical components of the curriculum (Barraket, 2005).

Furthermore, scientific educators in the early twenty-first century face a slew of challenges. Indeed, learners in the United States continue to fall behind students in other countries, particularly in Europe and Asia, in terms of science achievement (National Center for Education Statistics [NCES], 2007).

The main goal of this study is to discover the challenges that teachers face when using Modular Approach in Teaching in the Philippine public secondary schools. Furthermore, the purpose of this study is to determine the approaches, interventions, or solutions employed by every educational institution, as well as the government, in aiding students, parents, and teachers who are having difficulties with this new learning modality.

Self-educational materials are very compelling methodology for acquainting fundamental data with a whole class, opening up lecture conversation hours for additional "discussions" and less "lecture," an advancement action for gifted understudies, a technique for those who are missing classes, and a technique for a student who need remedial lectures. (Macarandang, 2009).

According to another study, the interactive learning tools that have been built are beneficial and helpful in boosting students' communication skills. The instructional materials provide content that is relevant, effective, and caters to diverse learning styles and preferences, as well as stimulate cooperative learning, based on the teacher experts who try out the resources and the number of students who used them. (May-as, 2006).

According to B. F. Skinner (1983), one strategy to keep the learners' attention is to provide them activities that they can do on their own after the teacher has given them adequate supervision, direction, instruction, and encouragement. The employment of pre-programmed instruction as a teaching aid is referred to as this. These pre-programmed resources can possibly make learning enjoyable.

In terms of planning, teaching, and learning, academic personnel play a critical role. Rather than operating in a vacuum, the operations are carried out in accordance with the nature of the institution. Academic staff should be aware of the institutional culture in which they employ, including the organizational mission, vision, as well as its aims, ethos, and values. The culture and character of the institution have an inextricable influence on the curriculum. (Stefani, 2008).

It is essential to consider educational issues during the planning of learning activities to ensure that the learning process is successful. This paper looks at how teachers might use commonsense information obtained collectively over the internet to help them organize learning activities that address pedagogical challenges addressed by four notable authors in their Learning Theories: Freire et al. (2009).

The process of acquiring and assessing information regarding a student's learning is known as distance learning evaluation. It will be utilized to go with a choice and draw the most ideal deductions in regards to the student's degree of accomplishment and the nature of instructions. (Leroux, 2018).

Doing scientific investigations, laboratory activity, using simulation and verification instrument are the test summative evaluation instruments that consider performance tasks that can be used for the assessment according to DepEd Order No. 031, s. 2020, but with modular approach the teacher is also unsure whether its the student who did the activity or the parents/guardian.

It is necessary to provide a consistent experience for students in remote places in order to maintain the assessment's reliability and validity. Educators might have more faith in the conclusions of an evaluation if it is accurate and reliable. Students will be able to get the help they need to excel in their academics as a result of this. (Laitusis, 2020).

This study is anchored on Moore's Theory of Transactional Distance. In this Theory, Michael G. Moore (1997) claims that in distance learning scenarios, the teacher-student separation might "lead to communication gaps, a psychological space of potential misunderstandings between teachers' and learners' behaviors" (Moore & Kearsley, 1996). In their review of Moore's theory's present relevance, Giossos et al. (2009) expand on this idea. They stated that:

... gap learning's particularities of space and time pertaining to teacher and student produce unique behavioral models for the teacher and learner, as well as psychological and communication distance between them and a lack of comprehension of each other. (Gios-sos, et al., 2009, p. 2)

Moore's hypothesis was especially significant since it given a focal point through which the researcher could assess the utility of utilizing augmented reality, despite the fact that the review's strategy was not trial in the conventional sense. Moore's ideas provided a theoretical framework within which the researcher can quantify and interpret the responses of the research respondents into answers or solutions to the research objectives listed below, by discussing the value of dialogue and association, its different structures, and what it means for the student's insight.

Science has a wide range of effects nowadays, therefore it is a very broad topic to address. Understanding and interpretation of science are influenced by the niche that has been chosen in this particular context. Educators and students should be aware that the places where all scientific events and theories are debated are not limited to classrooms. Science, by virtue of its breadth, also entails a variety of challenges.

Most students in the Philippines face a variety of challenges, including family problems, poverty, and a large number of pupils in each classroom, as well as a lack of motivation and poor self-confidence, trouble in science, and bullying. Each of these problems has a significant impact on students' learning. In this pandemic year, distance learning apparently has incredible effect, also, to the actual students.

METHODS

The research design used is descriptive using quantitative data. This research design is the most appropriate for this study since the aim of this is to evaluate the modular approach in teaching science using the different variables.'

The respondents of this study came from the group of secondary science teachers in 19 public schools in SDO Calamba City. With a total of 167 Science teachers. 137 of them were subjected to this study while the remaining thirty (30) were asked to answer as part of the pilot testing.

This study used a researcher-made questionnaire which was divided into two parts: the demographic profile with the respondents' age, sex, education and years of service and the indicators which was subdivided into 4 major variables: content, instructional materials, pedagogical approaches and assessment. The demographic profile is a checklist type, while, a four-point Likert scale was used for the 4 major variables.

The instrument was checked and validated by 3 Science Master Teachers from different divisions. Comments and suggestions were taken into consideration. Test of Reliability was also done to establish the internal consistency of the instrument using the Cronbach Alpha. The reliability index for the whole questionnaire is 0.959 consisting of 29 items all in all which means that the questionnaire can produce valid and reliable results.

For statistical treatment of data, frequency and percentage analysis was used for the demographic profile of the respondents and weighted mean for the indicators.

In order to determine, if there is a significant difference when respondents are grouped according to their sex T-test was used for the independent samples and analysis of variance for the significant difference when respondents are grouped according to age, education & years of service.

RESULTS AND DISCUSSION

Table 1. Demographic Profile of the Respondents

Age	Frequency	Percent
20 to 30 years	44	32.1
31 to 40 years	53	38.7
41 to 50 years	29	21.2
51 to 60 years	11	8.0
Sex		
Male	22	16.1
Female	115	83.9
Education		
BS Degree	66	48.2
With Masteral units	30	21.9
Masters degree	39	28.5
Doctoral units or degree	2	1.5
Years of service		
1 to 5 years	52	37.9
6 to 10 years	54	39.4
11 to 15 years	11	8.0
16 to 20 years	11	8.0
more than 20 years	9	6.6

The study considered the profile of the respondents. Table 1 shows the respondents' demographic profile in terms of age, gender, educational achievement, and years of service. It appears that the majority of them are between the ages of 31 and 40 years old, accounting for 38.7% ($n = 53$) of the respondents, while just 8.0 % ($n = 11$) are between the ages of 51 and 60 years old. Also, presented on the table that most of the respondents can be said to be matured enough in handling life and scholastic concerns.

In case of sex, majority of respondents are female, accounting for 83.9 % ($n = 115$) of the population, while male science teachers account for 16.1 % ($n = 22$). Despite this, the females outnumbered the males in this study. More intriguingly, women's participation in teaching looks to be steadily growing, according to World Bank data. Male teachers are being alluded to as the "dying breed" in schools, which has started inescapable concern (Thomas, 2016).

Meanwhile, the majority of the respondents are professional teachers with a teaching license and baccalaureate degrees from various universities and state colleges. However, more than half of them are furthering their education by enrolling in post-graduate programs. In fact, 28.5 % ($n = 39$) of them have earned a Masteral Degree, while others are still working toward earning one and a doctorate degree. This indicates that these respondents believe that to succeed and stay current as a scientific teacher, they must continue their education.

In terms of public service, on the other hand, a major portion of the respondents have already served the public for 1 to 10 years. This demonstrates that today's science teachers have adequate experience to be of assistance. According to Kini and Podolsky (2016), teachers develop at a faster rate in their first few years on the job, but they continue to improve, although at a slower rate, throughout their careers.

Table 2. Modular Approach in Teaching Science in terms of Content

	Indicators	Mean	Verbal interpretation	Rank
1.	Identified MELCs in Science are the most important competencies that have to be learned by the learners.	3.71	Strongly Agree	1
2.	The SLM enables the learner to acquire the skills and competencies in the MELC.	3.42	Agree	3.5
3.	Objectives and competencies in Science are achievable in the given time frame.	3.31	Agree	11
4.	Contents are relevant to the lesson and self-pacing which allow learners to progress at their own rate.	3.42	Agree	3.5
5.	The SLM provides a complete demonstration of the Science concepts.	3.28	Agree	12
6.	Contents are suitable to the students' level of development.	3.34	Agree	10
7.	Contents provide for the development of higher cognitive skills such as critical thinking, creativity, learning by doing, inquiry, problem-solving, etc.	3.35	Agree	9
8.	Content and text fonts are easy to read (appropriate size, color, and style).	3.37	Agree	6
9.	The Content is appropriate to the grade level and is aligned with the MELCs.	3.53	Agree	2
10.	The activities in the SLM are designed to facilitate the learning in the students' pace.	3.36	Agree	7.5
11.	The language used and the instructions are appropriate and easy to understand by the learners.	3.36	Agree	7.5
12.	Contents are free of ideological, cultural, religious, racial, and gender biases and prejudices.	3.39	Agree	5
	Composite mean	3.40	Agree	

Legend: 3.50-4.00= Strongly agree; 2.50-3.49= Agree; 1.50-2.49=Disagree' 1.0-1.49= Strongly disagree

Table 2 provides the weighted means describing the Modular Approach in Teaching Science in Terms of Content. With a computed composite mean of 3.40, respondents generally agree that the content being implemented in the modular method is satisfactory. Science teachers are satisfied with the content of the SLM as it is congruent to the MELCs. Its objectives and most of the activities presented to the SLM is also attainable. Hence, this indicates that the use of a modular approach with secondary students has been successful in terms of providing them with the necessary competencies and concepts similar to the results obtained by Valencia (2020) in her quasi-experimental study entitled Modular Approach in Teaching Science 10. According to her research, after adopting the modular approach to teaching, students' post-test performance on several competencies improved considerably, and they were categorized as proficient. This showed that the technique had yielded positive results and had a considerable impact on the academic advancement of the students.

Further, ranked first in this variable is the indicator "*Identified MELCs in Science are the most important competencies that have to be learned by the learners*" with a weighted mean of 3.71 interpreted as Strongly Agree. This indicates that respondents support the Department of Education's modification of learning competencies for learners to explore. Given the current situation in the education sector during this pandemic, science teachers unanimously agreed that identifying the most important learning competencies among these is a must. Reducing the competencies and focusing on the science most essential learning competencies (MELCs) in this time of modular approach in teaching science could really help the students focus on their lessons that are prerequisites to their lessons for the next grade level.

However, with a weighted mean of 3.28, the indicator "*The SLM provides a complete demonstration of the Science concepts*" came in last, verbally interpreted as Agree. This statement is the least popular among responders among all of the variables' indicators. Science teachers still believe that demonstration of science concepts can be best done in actual set-up where students can see the actual demonstrations of experiments then students will be able to come up with their ideas & concepts. As a result, it is suggested that the discovered SLM be revisited in the Science curriculum for junior high school.

Table 3. Modular Approach in Teaching Science in terms of Instructional Materials

	Indicators	Mean	Verbal interpretation	Rank
1.	The Self-Learning Module released by the Central Office and Regional Office is the main source of information used by the learners.	3.38	Agree	6
2.	Video lessons help students to learn concepts in Science.	3.65	Strongly Agree	1
3.	Learning Activity Sheets (LAS)/worksheets serve as a supplementary learning material that helps in enhancement of the lesson.	3.64	Strongly Agree	2
4.	Contextualized self-learning modules for my students makes learning more possible.	3.53	Strongly Agree	3.5
5.	Instructional materials provided to the learners are valid and enable the attainment of mastery level.	3.43	Agree	5
6.	Utilization of online applications and other Learning Management System (LMS) support students' learning.	3.53	Strongly Agree	3.5
	Composite mean	3.52	Strongly Agree	

Legend: 3.50-4.00= Strongly agree; 2.50-3.49= Agree; 1.50-2.49=Disagree' 1.0-1.49= Strongly disagree

As per table 3, Modular Approach in Teaching Science in Terms of Instructional Materials, majority of respondents find modular science teaching to be pleasing, with a computed composite mean of 3.52. The science teachers appreciate that the SLM provides links for videos in some lessons that needed further clarifications. Most of the instructional resources utilized in this modality have a significant contribution to the comprehension of the science ideas being studied, owing to the resourcefulness and creativity of Science teachers. As indicated by Reyes and De Guia (2017), learning is simplified by the utilization of a scope of educational materials; therefore, students are bound to learn since they are headed to acquire information and capacities.

Meanwhile, ranked first is the indicator, "Video lessons help students to learn concepts in Science" with a weighted mean of 3.65 verbally interpreted as Strongly Agree. This implies that, even if they are using a modular approach in teaching Science, Science teachers are using video lessons as additional materials to help their students understand each lesson. Teachers recognize the necessity of visual engagement for students to learn. According to a study conducted by Bullo (2021) on Integration of Video Lessons to Grade 9 Science Learners Amidst COVID-19 Pandemic, in all learning capacities, video courses were more viable, but particular methodologies in certain areas were likewise powerful in assisting understudies with learning at this difficult time. Even without the assistance of a teacher, video lessons helped students better learn and absorb the lectures. Given this data and knowledge, a mix of video courses and modular teaching methodologies will result in effective learning.

However, "The Self-Learning Module released by the Central Office and Regional Office is the main source of information used by the learners" ranked last with 3.38 weighted mean interpreted as Agree. This indicates that respondents are concerned that the self-learning materials will not provide all of the information required for students to learn. These SLMs serve as a guide for what to teach each week, but they are not the primary source of information. Even with a modular approach, teachers acknowledge other learning materials to ensure that learning takes place.

Table 4. Modular Approach in Teaching Science in terms of Pedagogical Approaches

	Indicators	Mean	Verbal interpretation	Rank
1.	Assisting learners through social media (Facebook, messenger, etc.) help them in dealing with their learning tasks.	3.67	Strongly Agree	5
2.	Establishing teachers' presence even in modular modality helps learners feel learning as engaging.	3.68	Strongly Agree	3.5
3.	Giving clear and concise instructions makes everything easy for them to know what they have to do each week.	3.72	Strongly Agree	1
4.	Learning procedures stated in their WHLP help them attain the desired objective in a week.	3.66	Strongly Agree	6
5.	Capacitating learners' parents/guardians is vital in facilitating student learning.	3.68	Strongly Agree	3.5
6.	Parents/Guardian's participation is necessary for their children's progress.	3.71	Strongly Agree	2
	Composite mean	3.69	Strongly Agree	

Legend: 3.50-4.00= Strongly agree; 2.50-3.49= Agree; 1.50-2.49=Disagree' 1.0-1.49= Strongly disagree

Table 4 presents the Modular Approach in Teaching Science in Terms of Pedagogical Approaches. It can be seen on the table with an evident computed composite mean of 3.69, the respondents are very satisfied with the

implementation of the modular approach in terms of pedagogy. This indicates that teachers feel that a pedagogical approach must be used in any distance learning mode including the modular. Learners should be guided in their own learning by their teachers, parents, and/or guardians, especially in Science since teachers of this area believe that this is one of the most difficult, and that it must be well-explained and led.

Teachers have long regarded engaging students in Science study as a difficult task. Even though Science is perceived to be difficult, teachers may make it engaging by using the right teaching style and designing activities. However, due to its restrictions, the modular approach may prove to be more difficult (Arrieta, Dancel, & Agbisit, 2020). Despite these limitations, Science teachers discover strategies to assist students in completing their assignments in order to ensure learning.

First on the rank is the indicator *"Giving clear and concise instructions makes everything easy for them to know what they have to do each week"* with a weighted mean of 3.72 which is verbally interpreted as Strongly Agree. It means that Science teachers using the modular approach in teaching should make sure that students are well-informed about their activities and assignments by giving them clear and precise instructions. This has to be the most significant strategy a Science teacher can use to assist students who are learning the topic in a modular manner. Giving clear and concise instructions motivates the learners to complete their learning tasks. According to Nardo (2017), learners are more likely to stay on task during independent study if the teacher provides clear demonstrations and explanations. Students' diligence and creativity are sparked by the teacher's challenges. Clearness of point, task and cycles, proper observing, and the arrangement of ideal input to students, as indicated by different specialists, lead to a superior effect of independent study.

On the other hand, with a weighted mean of 3.66 interpreted as Strongly Agree, the indicator *"Learning procedures stated in their WHLP help them attain the desired objective in a week"* ranked last. Providing directions and guidance in the Weekly Home Learning Plan (WHLP) is undoubtedly crucial, even if it is the least relevant of the indicators. This WHLP acts as a blueprint for learners and their guardians to follow in terms of what they should accomplish in a given time frame. This plan contains all of the instructions and other actions that the teachers are unable to carry out physically and personally owing to the pandemic's constraints.

Table 5. Modular Approach in Teaching Science in terms of Assessment

	Indicators	Mean	Verbal interpretation	Rank
1.	Assessment of learning in Science in modular modality provides judgment and decisions about students' level of achievement.	3.32	Agree	3
2.	Assessment conducted in modular distance learning are valid, reliable and credible for its intended purpose.	3.24	Agree	5
3.	Assessment result in modular teachings and learning provide teachers' feedback about the student's learning.	3.38	Agree	2
4.	Feedback to the students' work helps them improve in their learning.	3.55	Strongly Agree	1
5.	The SLM provides sufficient assessment activities that will help learners track their progress.	3.31	Agree	4
Composite mean		3.36	Agree	

Legend: 3.50-4.00= Strongly agree; 2.50-3.49= Agree; 1.50-2.49=Disagree; 1.0-1.49= Strongly disagree

Meanwhile, table 5 displays the Modular Approach in Teaching Science in Terms of Assessment. The respondents are satisfied with the implementation of assessment in modular learning modality evident to the computed composite mean of 3.36. However, while activities in distance learning are attempted to be similar to those in traditional education, there are some issues, particularly in the assessment and evaluation process, and students are not adequately assessed in the process. In comparison to traditional classroom education, the modular approach encounters a variety of assessment difficulties.

Prior to the epidemic, Estrada (2020) claims that the previous student assessment system had already been called into question. It subjected students to frequent assessment for the sake of assessment. This may deteriorate in a distance learning environment. Furthermore, the Department of Education (DepEd) claiming "leniency to learners who are put at a greater disadvantage by the pandemic while without jeopardizing the integrity and principles of assessment and grading," under Order No. 31 on October 2.

Ranked first interpreted as Strongly Agree is the indicator *"Feedback to the students' work helps them improve in their learning"* with a computed weighted mean of 3.55. As the teacher examines the students' performance, providing feedback to them is equally vital to keep them informed about their progress through the modules. However, the existing method of learning and imparting education creates a dilemma for teachers in terms of how to address students' performance. Feedbacking is a way for Science teachers to communicate with one another and with their students.

However, last on the rank is the indicator, *"Assessment conducted in modular distance learning are valid, reliable and credible for its intended purpose"* with weighted mean of 3.24 interpreted as Agree. This implies

that science teachers are unsure about the results of the several evaluations that they have given to their modular students. It is possible that they do not physically monitor and observe their students' performance.

Table 6. Summary Table on Modular Approach in Teaching Science

Indicators	Mean	Verbal interpretation	Rank
1. Content	3.40	Agree	3
2. Instructional Materials	3.52	Strongly Agree	2
3. Pedagogical Approaches	3.69	Strongly Agree	1
4. Assessment	3.36	Agree	4
Overall mean	3.48	Agree	

Legend: 3.50-4.00= Strongly agree; 2.50-3.49= Agree; 1.50-2.49=Disagree' 1.0-1.49= Strongly disagree

Table 6 presents the summary of Modular Approach in Teaching Science. As shown, respondents strongly agree on the modular approach in terms of pedagogical approaches and instructional materials while they also agree on its implementation in terms of content and assessment. However, they agree to the overall implementation of modular approach in teaching Science with an overall mean of 3.48. This means that ample time were given enough to the students to accomplish the given modules while completing their chores with modular distance learning. The modules aren't perfect in and of themselves. The content is set by the teachers that designed them, and they differ from every school. Because of a well-explained module, some students may have no difficulty understanding their lessons, but others may not be so fortunate. The degree of learning varies due to the lack of standard books. The straightforwardness with which module material can be surveyed and credit allowed makes acknowledgment of earlier learning and credit move simpler. In any case, the discoveries of this study support Estrada's (2020) affirmation that modules should be sufficiently evaluated by teachers for students to get satisfactory criticism for progress.

Table 7. Significant Difference in the Modular Approach in Teaching Science when Grouped by Profile

		Content Mean (SD)	Instructional Materials Mean (SD)	Pedagogical Approaches Mean (SD)	Assessment Mean (SD)
Sex	Male	3.48 (0.44)	3.50 (0.45)	3.59 (0.46)	3.35 (0.44)
	Female	3.39 (0.44)	3.53 (0.54)	3.70 (0.42)	3.36 (0.51)
	t-value	0.905	0.281	1.138	0.077
		NS	NS	NS	NS
Age	20 to 30	3.49 (0.46)	3.57 (0.50)	3.68 (0.47)	3.47 (0.55)
	31 to 40	3.33 (0.41)	3.46 (0.41)	3.63 (0.43)	3.30 (0.46)
	41 to 50	3.42 (0.45)	3.55 (0.45)	3.78 (0.38)	3.30 (0.51)
	51 to 60	3.32 (0.48)	3.53 (0.38)	3.74 (0.40)	3.42 (0.37)
	F-value	1.192	0.611	0.888	1.185
		NS	NS	NS	NS
Education	BS Degree	3.46 (0.41)	3.55 (0.42)	3.66 (0.43)	3.46 (0.44)
	With Masteral units	3.43 (0.44)	3.61 (0.39)	3.77 (0.36)	3.33 (0.55)
	Masters degree	3.30 (0.48)	3.40 (0.51)	3.66 (0.47)	3.25 (0.52)
	Doctoral units or degree	3.04 (0.41)	3.84 (0.23)	3.84 (0.23)	2.90 (0.42)
	F-value	1.606	1.847	0.620	2.192
		NS	NS	NS	NS
Years of service	1 to 5 years	3.43 (0.45)	3.53 (0.49)	3.66 (0.46)	3.43 (0.51)
	6 to 10 years	3.43 (0.40)	3.56 (0.41)	3.72 (0.40)	3.39 (0.49)
	11 to 15 years	3.39 (0.45)	3.53 (0.48)	3.59 (0.51)	3.29 (0.41)
	16 to 20 years	3.17 (0.47)	3.21 (0.37)	3.68 (0.43)	3.00 (0.55)
	F-value	3.31 (0.56)	3.59 (0.41)	3.72 (0.42)	3.27 (0.33)
		1.140	1.452	0.342	1.892
		NS	NS	NS	NS

Legend: NS Not significant

Table 7 presents the test of significant difference in the Modular Approach in Teaching Science when Grouped by Profile. In terms of sex, the t-tabular = 1.984 is greater than the computed t-value of content ($t = 0.905$), instructional materials ($t = 0.281$), pedagogical approaches ($t = 1.138$) and assessment ($t = 0.077$) at 5% level of significance. Hence, the decision to accept the null hypothesis seems to be valid and practical. Thus, in all these variables, there is no significant difference on the responses of the respondents when grouped according to their sex. Whether you are male or female, the approach in teaching science is still the same in this time of distance learning.

Meanwhile, at a 5% level of significance, the f-tabular, which is 3.9491, is greater than the computed f-value for all the variables: content ($f = 1.192$), instructional materials ($f = 0.611$), pedagogical approaches ($f = 0.888$),

and assessment ($f = 1.185$). This leads the researcher to accept the null hypothesis which means that there is no enough evidence to say that age can affect teaching science in modular approach.

When respondents are classified by educational attainment, however, their attitudes on the implementation of the modular approach in terms of assessment appear to differ. It is evident in the computed f -value of 2.192 which is less than the f -tabular of 3.9491. This indicates that the researcher must accept the null hypothesis in this case, resulting in the conclusion that when respondents are categorized according to educational attainment, the implementation of the modular method does not differ in terms of assessment. Also, the researcher has to accept the null hypothesis for content ($f = 1.606$), instructional materials ($f = 1.847$) and pedagogical approaches ($f = 0.620$) at 5% level of significance.

Finally, when grouped according to years of service, the f -tabular of 3.4795 is greater than the computed f -values of content ($f = 1.140$), instructional materials ($f = 1.452$), pedagogical approaches ($f = 0.342$), and assessment ($f = 1.892$) at 5% level of significance. These imply that the null hypothesis should be accepted.

In general, the findings show that respondents had similar perspectives on the implementation of a modular approach in teaching Science in this time of pandemic in terms of content, instructional materials, pedagogical approaches, and assessment. They do agree with the ratings they have provided for each variable even when grouped according to their profile. When respondents were classified according to their education, however, it was clear that they had differing opinions on the assessment scheme used for the modular approach. Those Science teachers with units or a doctorate degree gave the lowest weighted mean of 2.90 among others, according to the data. This suggests that, in a modular approach, student learning assessment should be unified and standardized by developing a prototype assessment tool for teaching and learning Science.

While the overall result indicates that the modular approach is effective, the statistics also indicate that the practice might be improved. Again, this conclusion is in line with Estrada's (2021) argument, who stated the necessity to address the modules' and modular approach's weak points in order to provide a more suitable learning experience for Filipino students. There are many more issues with modular learning, but these are the most common. Both students and teachers have a disadvantage. Although it is difficult to admit, the quality of education may have deteriorated. It's not their fault, though, because the pandemic is still on going. Learning on your own is difficult.

Table 8. Proposed Action Plan for Enhancement of Teaching Science Using Modular Approach

Key Results Area (KRA)	Activity/ Strategy	Success/ Performance Indicators	Persons Involved
CONTENT			
Objectives: To identify least mastered competencies in each quarter.	Form a Science Teachers Quality Circle (STQC) who will be responsible in monitoring the least mastered competencies.	Science Teachers should conduct item analysis every after assessment.	Science Teachers Head Teachers Master Teachers
To revisit the content of each self- learning module being distributed to the learners.	STQC will check and update the content of the Science SLM.	Pre- and post- evaluation of the learning materials should be re-checked by the Science Master Teacher before printing and distribution.	Master Teachers Head Teachers
ASSESSMENT			
Objectives: Sustain objective, valid, and reliable assessment mechanism	Kumustahan sa New Normal (KNN) <ul style="list-style-type: none"> Clustering of students according to their location to be sure they have the same internet capacity. Presentation of a quarterly schedule of "kumustahan" to parents & guardians. Assessment and Validation of Student Learning (AVSL)	Strengthen the feedbacking mechanisms between and among teachers, learners and parents Conduct quarterly validation of student learning through online, phone call or home visitation	Science Teachers Learners Parents Science Teachers Learners

CONCLUSIONS

1. The greater part of the respondents when it comes to demographic profile, are female, 31 to 40 years old, baccalaureate degree holders, and have 6 to 10 years' experience in the service.
2. The respondents strongly agree on the success of the modular approach in terms of pedagogical approaches and instructional materials. However, they are just satisfactory in terms of content and assessment.

3. There was no significant difference among the responses of the respondents when they are grouped according to sex, age, educational attainment, and years of service.
4. The proposed action plan is designed to enhance teaching Science in a modular approach.

RECOMMENDATIONS

1. Schools are advised to conduct Learning Action Cell (LAC) Sessions related to scrutinizing the Science concepts in self-learning modules released by the Department of Education.
2. Science teachers may craft localized and contextualized learning activity sheets and learning materials with consideration on growth and development of the learners.
3. Schools Division Office of Calamba City and all secondary schools in the city may consider the production of video lessons relevant to the most essential learning competencies. Expenses relative to this such as the materials and equipment can be included in the school's annual procurement plan.
4. Other means of communication, aside from social media, may be made possible to allow open communication between school and home. Learners who do not have access to technology may be given extra attention so that they do not become disoriented. Home visitation is the most possible way.
5. To validate the reliability and validity of the scores provided by the learners, revalida or any other evaluation mechanism might be used. Learners may be taught that their learning is their own responsibility.
6. The proposed action plan to enhance Science teaching in a modular approach may be considered subject to validation by the school principals and education program supervisor before its full implementation.
7. Schools may adapt the validated action plan to unify the actions of all the schools in SDO Calamba City.
8. For the future researchers, they may use the results of this study as their reference in their future study.
9. Different research of a similar topic may be done to validate the findings of the study or the viability of the proposed activity plan.

ACKNOWLEDGEMENT

My heartfelt gratitude to Dr. Merlita C. Medallon. Her prompt suggestions, rigorous investigation, and scientific approach have really aided me in completing this paper.

Mr. Rico Herrero, my co-teacher, deserves sincerest gratitude for his keen interest in assisting me at every stage of my research. His prompt ideas, delivered with politeness, enthusiasm, and dynamism, astonished me and enabled me to finish my thesis.

I'd like to express my warmest thanks to the Science teachers of SDO Calamba City who took part in answering the questionnaire for this paper. Special thanks to all my “anakish” in PIS for the unlimited support.

It is my pleasure to express my deepest love and gratitude to Mhon, my life partner, for always believing in me. Karl, Sophia, Denise, and Aliah, my wonderful children who never cease to amaze me. To my Manalo & Avino family I love you all.

Above all, the author of knowledge and wisdom, the Great Almighty. Thank you Lord for being a good Father & a loving God.

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Appendix A. Questionnaire

Name (Optional): _____
 Age: _____ Sex: _____ No. of Years in the Service: _____
 Highest Educational Attainment: _____

Instructions:

The following indicators evaluate teaching science in modular distance learning modality. Kindly answer all the questions in the questionnaire by putting a check mark (/) on the space provided. Your responses are expressed in different degrees of reactions as shown below.

- 4 - Strongly Agree
 3 - Agree
 2 - Disagree
 1 - Strongly Disagree

Content

Indicators	4	3	2	1
1. Identified MELC in Science are the most important competencies that have to be learned by the learners.				
2. The SLM enables the learner to acquire the skills and competencies in the MELC				
3. Objectives and competencies in Science are achievable in the given time frame				
4. Contents are relevant to the lesson and self-pacing which allow learners to progress at their own rate.				
5. The SLM in Science provides a complete demonstration of the concept				
6. Contents are suitable to the students' level of development.				
7. Contents provide for the development of higher cognitive skills such as critical thinking, creativity, learning by doing, inquiry, problem-solving, etc.				
8. Content and font are easy to read (appropriate size, color, and style)				
9. Content in the SLMs in Science is appropriate to the grade level and is aligned with the MELC.				
10. Activities are designed to facilitate the learning of its content.				
11. Language in SLMs is appropriate to the grade level.				
12. Contents are free of ideological, cultural, religious, racial, and gender biases and prejudices.				

Instructional Materials

Indicators	4	3	2	1
1. The Self-Learning Module released by the Central Office is the main source of information used by the learners.				
2. Video lessons help students to learn concepts in Science				
3. Learning Activity Sheets (LAS)/worksheets adds up to the attainment of MELC				
4. Utilization of online applications and software supports students' learning.				
5. Contextualized self-learning modules for my students makes learning more possible.				
6. Instructional materials provided to the learners are valid and enable the attainment of mastery level.				

Pedagogical Approaches

Indicators	4	3	2	1
1. Assisting learners through social media (Facebook, messenger, etc.) help them in dealing with their learning tasks.				
2. Establishing teachers' presence even in modular modality helps learners feel learning as engaging.				
3. Giving clear and concise instructions makes everything easy for them to know what they have to do each week.				
4. Learning procedures stated in their WHLP help them attain the desired objective in a week.				
5. Capacitating learners' parents/guardians is vital in facilitating students' learning.				
6. Parents'/Guardian's participation is necessary for their children's progress				

Assessment

Indicators	4	3	2	1
1. Assessment of learning in Science in modular modality provides judgment and decisions about students' level of achievement.				
2. Assessment conducted in modular distance learning are valid, reliable and credible for its intended purpose				
3. Assessment results in modular teaching and learning provide teachers feedback about the students' learning.				
4. Feedback to the students' work helps them improve in their learning.				
5. Assessment in modular learning modality calls upon the integration of ICT.				

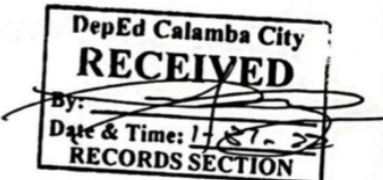
Appendix B. Letter to schools division superintendent

Lyceum of the Philippines University Graduate School

January 31, 2022

To: **SUSAN DL. ORIBIANA**
Schools Division Superintendent
Division of Calamba City

Thru: **MA. FE LORELEI E. AMON**
Education Program Supervisor - Science
Division of Calamba City



Madam/Sir:

Greetings of Peace!

The undersigned is a Graduate School student taking Master of Arts in Educational Leadership and Management at Lyceum of the Philippines University – Laguna and presently working on her thesis entitled "EVALUATIVE STUDY OF THE IMPLEMENTATION OF MODULAR TEACHING IN A CITY SCHOOLS DIVISION".

In connection to this, the researcher is formally requesting your good office the permission to allow her to conduct the study in the Secondary Schools Division of Calamba City and administer questionnaires to teachers teaching Science who will serve as the primary respondents of the study.

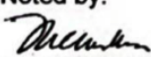
Rest assured that all data gathered will be treated professionally and with strictest confidentiality. Individual privacy will be maintained in all published and written data resulting from the study. Thus, research ethics will surely be considered.

Attached with is the letter to Science Teachers of SDO Calamba City as well as the copy of the survey questionnaire.

Your positive response on this request will be highly appreciated.

Respectfully,

MARIVEL M. DE GUZMAN
Researcher I
Email: marivel.deguzman@deped.gov.ph
Mobile: 09494370600

Noted by:

DR. MERLITA C. MEDALLON
Thesis Adviser / LPU Professor

1849- 554 9830 -loc. 11

Appendix C. Indorsement letter from office of SDS

Republic of the Philippines
Department of Education
 Region IV-A CALABARZON
 SCHOOLS DIVISION OF CALAMBA CITY

1st INDORSEMENT
 February 02, 2022

Respectfully returned to **Mr. MARIVEL M. DE GUZMAN**, interposing no objection to administer survey questionnaire to selected teachers in the Schools Division of Calamba City. This is for the completion of his research entitled **“Evaluative Study of the Implementation of Modular Teaching in a City Schools Division”**.

It is expected that adherence to DepEd’s time-on-task policy shall be observed, ensuring that no disruption of classes will occur and informed consent must be secured for all participants before the conduct of the said activity. It is also recommended that the data collection be administered online in line with the safety health protocols amidst COVID-19 pandemic. All the data gathered shall be used solely for the research purposes in compliance with Data Privacy Act 2012.

Requesting also that this office be furnished a copy of the results of the study.


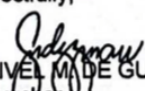

 **SUSAN DL ORIBIANA**
 Schools Division Superintendent

DMP/ Research Endorsement
 E20220012/February 02, 2022



Address: City Hall Compound, Brgy. Real, Calamba City, Laguna
Telephone No: (049) 554-9830 to 34
Email Address: calamba.city@deped.gov.ph
Website: <https://depedcalambacity.com.ph>

Appendix D. Sample letter to school principals

	LYCEUM OF THE PHILIPPINES UNIVERSITY GRADUATE SCHOOL	<i>Taking The lead</i>
February 5, 2022		
<p>HEIDI LANTACON Principal I Majada In Integrated School Calamba City, Laguna, Philippines</p>		
<p>Dear Madam,</p> <p>Greetings of Peace!</p> <p>The undersigned is a Graduate School student taking Master of Arts in Educational Leadership and Management at Lyceum of the Philippines University – Laguna and presently working on her thesis entitled "EVALUATIVE STUDY OF THE IMPLEMENTATION OF MODULAR TEACHING IN A CITY SCHOOLS DIVISION".</p> <p>Attached with is the endorsement letter signed by the Calamba City Schools Division Superintendent and a copy of the questionnaire, the researcher is optimistic that you will permit her to conduct this study in your school for all science teachers. Gathering of data procedure will be through dissemination of an electronic survey questionnaire via Google forms.</p> <p>The survey questionnaires for Science Teachers are readily available on the following link/URL:</p> <p style="text-align: center;">Questionnaires: https://tinyurl.com/MAELMquestionnaire101</p> <p>Rest assured that all data gathered will be treated professionally and with strictest confidentiality. Individual privacy will be maintained in all published and written data resulting from the study. Thus, research ethics will surely be considered.</p> <p>Your positive response on this request will be highly appreciated.</p> <p>Respectfully,</p> <div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="width: 45%;"> <p style="text-align: center;">  MARIVEL M. DE GUZMAN Researcher Mobile: (+63) 9494370600 Email: marivel.deguzman@deped.gov.ph </p> </div> <div style="width: 45%; text-align: center;">  </div> </div>		