TWO-WAY RADIO-BASED INSTRUCTION WITH SELF-LEARNING GUIDE SHEET: AN APPROACH TO MODULAR DISTANCE LEARNING

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Two-Way Radio-Based Instruction with Self-Learning Guide Sheet: An Approach to Modular Distance Learning

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Abstract

Academic performance as a variable in students' learning has been a matter of concern in light of the COVID-19 pandemic that led to the adaption of the Modular Distance Learning (MDL) using printed and digital modules. The study aimed at determining the effectiveness of the two-way radio-based instruction with a self-learning guide sheet as an approach to modular distance learning in improving the academic performance of learners in Sta. Rosa Elementary for the School Year 2021-2022. It involved 29 Grades 3-6 learners, with 14 learners for control group and 15 in the experimental group. The study utilized the quasi-experimental design, and the test scores were analyzed using Mean Percentage Score (MPS) and t-test. Data were gathered having considered their obtained score in the DepEd SLMs assessments according to grade-level standards. Findings revealed that the level of academic performance in English, Math, and Science of the control group in the pretest is "Did Not Meet Expectations" and was improved to "Satisfactory" in the post-test. On the other hand, "Fairly Satisfactory" level was shown in the experimental group pretest and was improved to "Outstanding" in the post-test. Also, there is a significant difference in the pretest and post-test scores of the experimental group. Moreover, there is a significant difference in the post-test scores of the learners between the control group and experimental group. Thus, the two-way radio-based instruction with self-learning guide sheet was more effective than simply using printed modules.

Keywords: mean percentage score, learning guide sheet, printed modular learning, modular instruction

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Context and Rationale

The COVID-19 pandemic has created unprecedented challenges economically, socially, and politically across the globe. More than just a health crisis, it has resulted in an educational crisis. During lockdowns and quarantines, 87% of the world's student population was affected and 1.52 billion learners were out of school and related educational institutions (UNESCO Learning Portal, 2020). The suddenness, uncertainty, and volatility of COVID-19 left the education system in a rush of addressing the changing learning landscape. UNESCO (2020) adds that while the full consequences of this outage will take years or even decades to unfold, preliminary data highlight immediate effects on student's academic performance and well-being: the COVID-19 pandemic required students to be educated from home which has been linked to lower performance on national tests, higher stress and anxiety, lower sleep quality, as well as a general decrease in student's wellbeing and academic performance.

Studies paint a negative picture suggesting a detrimental influence on academic performance and learning outcomes of learners in COVID 19 pandemic. For instance, scores on national exams in the Netherlands have been found to decrease by three percentile points after the shutdown of schools compared to the years before. Another study, involving students in Germany, reported that reduced study time has been linked to significant decreases in curriculum-based learning for children, adolescents and young adults, as families report to struggle with educating their children at home. Finally, more time spent at home has been linked to decreased literacy rates of learners even before the pandemic (Spitzer & Muzzlick, 2021).

Rotas and Cahapay (2020) revealed that the following categories of difficulties in remote learning in the Philippines that affected their academic performance: unstable internet connectivity, inadequate learning resources, electric power interruptions, vague learning contents; overloaded lesson activities; limited teacher scaffolds; poor peer communication; conflict with home responsibilities; poor learning environment; financial

related problems; physical health compromises; and mental health struggles. This study is supported in the study of Dayagbil et al. (2021) exploring the challenges and issues in teaching and learning continuity of public higher education in the Philippines as a result of the COVID-19 pandemic. The study found that there is a decline in learning outcomes or proficiency levels such that most of the students had difficulty complying with the learning activities and requirements due to limited or no internet connectivity, no additional support system, and low comprehension levels. These study results show that academic performance keep deteriorating

As academic performance is the underpinning problem in this study, it is defined as the measurement of student achievement across various academic subjects. Teachers and education officials typically measure achievement using classroom performance, graduation rates, and results from standardized tests (National Assessment of Educational Progress (2014). Academic performance of students is a key feature in education (Rono, 2013). It is considered to be the center around which the whole education system revolves. Narad and Abdullah (2016) opined that the academic performance of students determines the success or failure of any academic institution. According to Narad and Abdullah (2016), academic performance is the knowledge gained which is assessed by marks by a teacher and/or educational goals set by students and teachers to be achieved over a specific period of time. They added that these goals are measured by using continuous assessment or examinations results. Signh, Malik, and Signh (2016) also argued that academic performance of students has a direct impact on the socio-economic development of a country. Similarly, Farooq, Chaudhry, Shafiq and Behanu (2011), asserted that students' academic performance serves as a bedrock for knowledge acquisition and the development of skills. Additionally, Farooq et al., (2011) emphasized that the top most priority of all educators is academic performance of students.

Meanwhile, Literacy Education (2015) claims that while in developed nations, the majority of the population over the age of 17 possesses basic literacy skills in reading and writing, the rate of literacy in developing nations is much lower. This lack of widespread

literacy hinders the further development in academic competencies. Economic Research (2019) recorded through World Development Indicators a decrease of literacy rate in the Philippines from 93.5% to 82.5. Generally, 'literacy' also encompasses 'numeracy', the ability to make simple arithmetic calculations. As a result, poor literacy can have negative effects that go way beyond the school years – including emotional, social and financial burdens, most considerably, the impact on a child's academic performance and to emotional/social impacts, higher education and post-school.

Connectively, academic learning relies on literacy. Even if a student were to excel in mathematics, poor literacy can affect comprehension of exactly what worded mathematics problems are asking for. Literacy can cause school students to feel lost during class while concepts are being taught. Thus, poor literacy level greatly affects their academic performance as measured through their quarterly numerical ratings or grades (Lawal, 2017).

Over the years, a proportionate number of learners across the country demonstrated poor reading comprehension and this finding is substantiated by the results of global assessments in which Filipino learners participated. Recently, TIMMS and PIRLS (2019), an international organization in providing advice and research to developing nations, was in a hot seat after firing an affront but accurate remark about the poor learning results among Filipino learners particularly in Grades 4 and 5. The report was based on the three global assessments the Philippines participated in: 1) the Program for International Student Assessment (PISA) in 2018, 2) the Trends in International Mathematics and Science Study (TIMSS) in 2019, 3) and the first cycle of the Southeast Asia Primary Learning Metrics (SEA-PLM) in 2019. The 2018 PISA results revealed that the Philippines scored 353 in Mathematics, 357 in science, and 340 in Reading, all below the average of participating OECD countries.

At this point, the biggest impact of COVID-19 arises from the need to practice stringent social or physical distancing to prevent or mitigate its spread. Schools must find ways for learning to continue amidst the uncertainties brought about by COVID-19, while ensuring the health, safety, and well-being of all learners and teachers. To help learners,

parents, and teachers implement the learning delivery modalities, Self-Learning Modules (SLMs) and Self-Learning Guide Sheet (SLGS) are made available in print and offline/online digital formats for use this school year. In the Schools Division of Abra (SDO-Abra), from face-to-face (F2F), the schools division adopts Modular Distance Learning (MDL) using printed and digital modules.

Learners are now immersed on huge range of texts from Self-Learning Modules (SLMs) that are supposed to encourage them to dive in and explore. Here then, comes the problem on academic performance of Sta. Rosa Elementary School (SRES) especially to young learners. In almost all subjects, parents complained on learners' experience of increasing complexity and abstraction of concepts and texts, while also having to demonstrate their command of text at a satisfactory level. To assist the learners and their parents, the researchers conducted home visits with strict compliance to COVID-Task Force protocols. Apart from home visits, the school provided them with one-by-one speaker and OTG flash drive for audio files and MP3 lessons. However, the researchers feel it is necessary to employ other strategies or approach to reinforce learning.

Meanwhile, as recorded and assessed through home visitations and anecdotal records supported by the Mean Percentage Score (MPS) per quarter for the previous years, there were learners who always lag behind and their progression can be alarming to learning outcomes. Not all learners have similar learning pace, comprehension levels, and human and materials support system as discussed in the literature. This time of pandemic with modular instruction as the main modality, poor literacy skills can be deterrent to achieving optimum learning, as evidence in their quarterly academic performance. The researchers have noted concerns raised during School-Based Learning Action Cell (SLAC) sessions---the academic performance of learners has declined; such reasons were the discussed literature in this research. For instance, the Pre-test result of Philippine Informal Reading Inventory (PHIL-IRI) conducted in July 2019 in Sta. Rosa Elementary showed that 15 out of 58 pupils from Grades 2 to 6 were assessed to be under frustration level with problems in reading, comprehension as well as vocabulary and memory skills. Of all the performance

measures, it is very evident that the academic performance of pupils should be given the utmost priority and focus because it has been a leading problem.

Little is known about the pandemic's impact on the performance of K-12 students in Television-Based or Radio-Based learning environments—educational tools that became popular complements to modular instruction over the past year. With a limited number of studies focusing on measuring student performance of K-12 students in the Schools Division of Abra, a significant gap in the current literature remains unaddressed. Moreover, with the limited attention provided by scholars in the literature regarding the Modular Instruction transition in the country, formulating more robust strategies and initiatives may become a significant impediment for stakeholders.

Consequently, the Sta. Rosa Elementary School realized that there is an increasing demand for continuing quality education, teachers and parents alike need to be aware of this in order to help children develop not only their reading and writing skills but also their scientific and mathematical competencies. To address this gap, this research provides an assessment of the Self-Learning Guide Sheet (SLGS) and Two-Way Radio-Based Instruction as an approach to Modular Distance Learning status in Sta. Rosa Elementary School by evaluating the academic performance of Grades 3-6 for the current school year. Hence, it is the conduct of a delivery approach that blend with modular instruction to improve academic performance outcomes as the key element of literacy skills and academic performance. A two-way radio is an audio transceiver with both a transmitter and broadcast receiver, meaning it can allow users to transmit and receive communications across radio waves. All the user must do is push down the device's talk button to communicate to other radios on the same frequency. Before the two-way radio was invented, many long-distance communications were only done through lighting and hand signals. But now, two-way radios have become a staple for law enforcement, the military, and hobbyists to communicate (Draper, 2014). Unlike a broadcast receiver, which can only receive material, a two-way radio or hand-held radio is a radio that can both transmit and receive radio waves. It is an audio transceiver—a transmitter and a receiver in one device—used for two-way voice

communication with other users of radios of a similar make and model (Llego, 2020). (On the other hand, the SLGS are in congruence with the SLMs and MELCs that are to be used for instruction.

World Bank (2005) on Improving Education Quality with Interactive Radio Instruction Toolkit, showed that radio instruction is having a positive impact on children's learning, caregivers' teaching skills and community participation in early learning efforts. Also, a case study on a Two-Way Radio Systems for Schools and Colleges in England found that schools, colleges, universities, and other educational institutes are increasingly using two-way radio systems for rapid communication on health and safety as well as further education needs of students (Carlson, 2003). Moreover, Education Alliance, BEC ICT4E WG (2020) also relayed that throughout Florida district, entire schools' day, two-way radios serve an assortment of purposes on campuses all around the nation. Daycare centers, elementary schools, high schools and even colleges rely on two-way radio technology not only for communication but for safety purposes. Ho, Jennifer, and Hethal Thukral (2009) assessed the impact of Interactive Radio Instruction (IRI) for the hardest to reach students and found that the summative evaluations and outcome measures focused on what children have learned over the course of the program implementation to identify what the baseline of children's learning has significantly made progress. Since in the COVID-19 era, many communities in Washington, DC are not able to use these face-to-face measures consistently while children are out-of-school and so they suggested two scenarios for assessing implementation for settings where small groups can meet (less than 10 children), and in focusing on remote-only assessment practices. It has strengthened its Interactive Radio Instruction (IRI) after its programming effectiveness has been studied in a variety of contexts facilitated by teachers (EDC, 2020).

Action Research Questions

This action research sought to determine the effectiveness of the Two-Way Radio-Based Instruction with Self-Learning Guide Sheet as an approach to Modular Distance Learning in English, Math, and Science subjects of learners in Sta. Rosa Elementary School during the School Year 2021-2022. It specifically sought answers to the following questions:

1. What is the level of academic performance of the learners before and after the implementation of the intervention?

2. Is there a significant difference in the pretest and post-test scores of the learners in the experimental group?

H_O: There is no significant difference in the pretest and post-test scores of the learners in the experimental group.

3. Is there a significant difference in the post-test scores of the learners between the control group and experimental group?

H_o: There is no significant difference in the post-test scores of the learners between the control group and experimental group.

Innovation, Intervention and Strategy

The Two-way Radio-based Instruction with Self Learning Guide Sheet: An Approach to Modular Distance Learning as an innovation implemented a 1-hour session every day with intervals of the identified core subjects in a period of two-months to learners from Grades 3-6. These learners were provided with study tools and assistance in the accomplishment of their learning tasks through using the two-way radio as a modality to deliver the lessons and the Self-Learning Guide Sheet (SLGS) as a print material that enhances their competency in different learning areas. The SLGS specifically used as the learning tool during a two-way radio class. The proponents developed the SLGS in accordance to the LRMS standards. The intervention ran in a period of two months with content area integration to guide them in

the flow of the SLGS allowing them to learn and understand the weekly lessons while given the instruction while using the two-way radio as a modality. In the intervention, it made use of support learning resources particularly print and non-print materials. For print materials, locally developed SLGS were utilized and for non-print, audio-visual materials were from the Department of Education (DepEd) portal and DepEd Commons. To note, the utilization of these materials is encouraged by the Central Office as these have been uploaded weekly to DepEd TV down to the school division's official LRMS page and to the school levels. Alongside these materials, the proponents used the Press Talk Teach Teaching Strategy (PTTTS) with Self-Learning Guide Sheet (SLGS) to enhance targeted literacy skills in teaching and make the sessions interactive. Opportunities for practice with immediate feedback were also provided by the researchers as the participants worked individually and in small groups. If learners are in the same neighborhood or household, they may work in pairs or in group. Part of the sessions were reading intentionally for directions in the given tasks, allowing learners to demonstrate their understanding of the topics in the worksheets and SLGS verbally, and reading practices not only for English but for other subjects specially for Mathematics for numeracy and Science for concepts. Since literacy skills include four levels, low (locate and retrieve information), intermediate (make straightforward references), high (make inferences and interpretations with text-based support), and advanced (integrate ideas and information across texts to provide reasons and explanations), these activities were curated during the intervention (Mullis, Martin, Foy, & Drucker, 2012),.

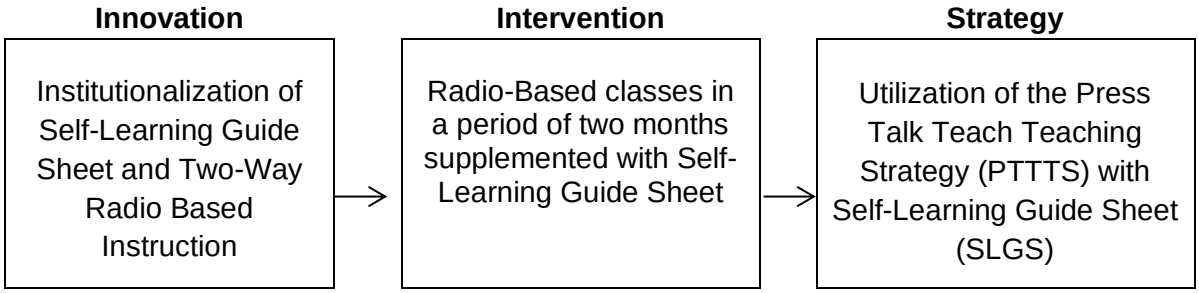
The Two-Way Radio Based Instruction with Self-Learning Guide Sheet and was conducted to increase the ability of the pupils develop literacy skills that would eventually improve their academic performance. It introduced the learners to the reading, listening, and writing processes and showed how teachers can help pupils realize the importance of effective strategies. Moreover, this project underscored the need to integrate other content area because literacy is not only concerned with the ability to read and write but also other types of literacy skills in the 21st century, as well as teachers and study tools having key

roles in preparing learners how to find, use, share, evaluate, and create information wisely. With improved literacy skills come along increased academic performance and learning outcomes.

Figure 1 shows the progression of the implementation of the study where the innovation is the institutionalization of Self-Learning Guide Sheet and Two-Way Radio Based Instruction, the intervention is the Radio-Based classes in a period of two months supplemented with Self-Learning Guide Sheet with instructional lesson tutorials in reference to the SLGS to be simultaneously conducted to the identified participants of the study, and the strategies were the employment of print and non-print study tools such as Utilization of the Press Talk Teach Teaching Strategy (PTTTS) with Self-Learning Guide Sheet (SLGS) to enhance targeted literacy skills with improved academic performance. Learners received the treatment in individual and group instruction.

Figure 1

Innovation, intervention, and strategy



Action Research Methods

Research Design

The quasi-experimental research utilizing pretest-posttest design was used in this action research. In a pretest-posttest design, the dependent variable is measured once before the treatment is implemented and once after it is implemented (Price, Jhangiani, & Chiang, 2016). Thus stated, this action research attempted to describe the difference in the pupils' level of academic performance before and after the implementation of the Self-Learning Guide Sheet and Two-Way Radio Based Instruction as an approach to Modular Distance Learning where each group was tested, however, under the control condition for control group and treatment condition for experimental group.

Participants and/or other Sources of Data and Information

The participants of the study were the twenty-nine (29) learners from Grades 3-6 of Sta. Rosa Elementary School during the School Year 2021-2022. This included six (6) Grade 3, four (4) Grade 4, eight (8) Grade 5, and eleven (11) Grade 6. In this case, fifteen (15) learners were assigned as the experimental group while the fourteen (14) represented the control group. The fifteen learners received the treatment; however, the fourteen learners underwent the traditional method with no treatment at all. These participants were the enrolled pupils listed in the official enrollment as reflected in the School Form 1 based on the Learners Information System of Sta. Rosa Elementary School. Inclusion to the study were based on the demographic characteristics of learners.

The results of the pupils' summative test/unit test served as the main source document of the said study. Data on the scores of the learners in the different subject areas were included. Information other than scores in summative assessment components of the pupils will not be considered in the result and discussion.

Data Gathering Methods

DepEd Order 31 s.2020- Interim Policy Guidelines for Assessment and Grading in Light of the Basic Education Learning Continuity Plan (BE-LCP) discussed the different types of assessment components and integrative performance tasks per quarter. Relative to this, a summative or unit test in Science, Math, and English as core learning areas served as the data gathering tools in this study. The unit test or summative test was composed of 20-item test within the quarter integrating two or more competencies found in the SLMs. The summative tests were administered to assess the content and performance standards that describe the knowledge, abilities, and skills that learners are expected to demonstrate. From the definitions of literacy, these tools may be used to measure the academic performance level of the participants. The impacts or changes that happen to the participants before and after the intervention were carefully observed and data were tabulated, treated with statistical analysis and interpreted to come up with a valid and logical answer to the problems in the study. The summative test results garnered by the participants specifically in the core learning areas Science, Math, and English were recorded as the pre-test data of the study.

Further, after conducting the pretest, the participants had undergone the Two-Way Radio-Based Remedial Instruction where the learners utilized study tools in print and non-print forms like worksheets with integration across the curriculum, and thus provided time solely for reading practices while memorizing and retaining concepts learned. The intervention included tutorials on the SLGS lessons to allow them to apply literacy skills mentioned in the previous discussions. The sessions were implemented within one (1) hour for two months, every day with intervals on the four subject areas among grade levels. The researchers served as the teacher-facilitators. To monitor a student's progress in literacy, progress monitoring should also be part of the assessment while intervention is administered. Rather than just taking a snapshot of the student's achievement at a single point in time, progress-monitoring assessments provide a baseline of a student's achievement, along with consistent re-assessment as he or she is progressing toward

learning outcomes. This was done by checking the learners' scores on the tasks contained in the SLMs answered weekly. After the sessions employing the proposed strategies and techniques during intervention, the participants were tested again to measure if there was a difference between their pretest scores and posttest scores. The scores determined their response to Radio-Based classes in a period of two months supplemented with Self-Learning Guide Sheet if it manifested an increase in literacy level of the learners involved in the study. The posttest data was taken from the four assessment components across the three learning areas transmuted into percentage grades for the succeeding quarter.

On the other hand, to test whether the instruments used in the said study were consistent across time (test-retest reliability), across items (internal consistency), the researchers used the Kuder-Richardson Formula 21. This was used to check if all combinations of questions is applicable when each question is either right or wrong. Thus, the value 0.738 tested showed that the test has high reliability and consistency.

Data Analysis

Mean Percentage Score (MPS) Ranking was used to measure the learner's level academic performance before and after the implementation of the Two-Way Radio-Based Instruction with Self-Learning Guide Sheet and as an approach to Modular Distance Learning. The t-test was employed in order to determine the differences in the test scores.

MPS/ Statistical Limits	Descriptive Rating
90-100	Outstanding
85-89	Very Satisfactory
80-84	Satisfactory
75-79	Fairly Satisfactory
Below 75	Did not meet Expectations (DE)

Ethical Issues

In conducting the study, ethical principles were considered. Before anyone participated in the study, the researchers understood that informed consent should be seen as a process rather than simply a document to be signed and it is the researchers' responsibility to ensure that potential participants fully understand what was involved as this was the basis for informed consent by participants and their parents. People participating in the research were entitled to confidentiality and anonymity and therefore information should not be divulged to anyone outside the research team unless prior authorization had been obtained while they experience the innovation of the research. The researchers ensured the protection and safety of the participants, avoiding infliction of physical, emotional, and psychological harm and hazards, thus, they are free to withdraw anytime if they wish to. Lastly, integrity and professionalism were observed during the execution of the study and appropriate acknowledgement of authors and sources used should be included.

Discussion of Results and Reflection

Level of Academic Performance of Learners

Table 1 shows the pretest and post-test results of Grade 3-6 learners along with the core learning areas tested in the study that measure their academic performance level. The overall MPS of the control group in the pretest are considerably very low interpreted as "Did Not Meet Expectations" and "Fairly Satisfactory" in the experimental group. The result implies that the learners did not reach the performance standards they need to acquire in their grade level particularly in the learning literacy areas such as English, Math, and Science. In other words, they fail to articulate core knowledge and skills, they should master that would demonstrate grade level learner outcomes in language learning, scientific contents, and mathematical concepts.

After the exposure to the modular distance learning using the traditional printed modules for the control group and the Two-Way Radio-Based Instruction with Self-Learning Guide Sheet, it can be seen on the table that there is an increase in their performance. The

control group's level of performance improved to 'Satisfactory". This finding explains that when the use of printed modular distance learning using the SLMs in each subject area for a period of time is effective.

As validated by Dangle and Sumaong (2020), modules promote self-directed learning. The acquisition of greater self-study or learning skills by students is one of the advantages of employing modules for instruction. The principles taught in the module are taken up by the students. They gain a sense of accountability as they complete the module's tasks. Learners progress on their own, with little or no aid from others. Also, Nardo (2017) backed Dangle and Sumaong's (2020) findings that in modular distance learning, learners are empowered; they are learning how to learn.

Consequently, it can be deduced from the pretest and post test results that even though there is an increased performance over time, the levels of academic performance need more enhancement as these levels are still in the lower limits. It means that there could be issues and challenges that hinder learners acquire skills and competencies and achieve their full potential leading to higher learner outcomes.

Salma and Rodriguez (2020) reported that one of the subjects that they are having greatest difficulty with is Mathematics. In Mathematics, some students said that most of the Math problems are difficult to solve and no detailed explanation is provided. Problem Solving does not only include and require computation but there is a need to understand and analyze the problem, it is important that students comprehend the problems and 90% of the participants had a hard time answering their modules.

Correspondingly, Alvarez (2021) found that some parents have difficulty understanding and answering the modules of their children. Some said that they do not have enough time to guide their kids due to work and other responsibilities. Some modules do not have clear instructions and explanations, so students have a hard time answering them. The pictures in the modules are not clear and the provided answer lines are too short. The modules have a lot of exercises, and the students lack motivation and focus. The issues encountered towards modular distance learning approach were communication failure like

that of instructions or confusion of students on the modules, limited teacher guidance, students in discourteous approach to teachers, complaints on not understanding the module, and all of which results to misbehavior on students and failure to pass worksheet on time.

Hence, with the aid of the Two-Way Radio-Based Instruction with Self-Learning Guide Sheet implemented to the experimental group, their performance was enhanced to "Outstanding" level. This means that the intervention is more effective than the use of the regular printed SLMs. It was able to address some of the challenges encountered by merely using the printed SLMs. The study's findings is also strongly corroborated by Elliot (2019) that given the pervasive use of Radio Based instruction, it is obvious that success, and the challenges with reading and numeracy achievement in Guyana, the introduction of it as a viable technology appeared to be a wise choice, as this was intended to introduce or reinforce educational concepts rather than provide a comprehensive curriculum, it was natural for MOE to expand the use of this medium and provide a complete mathematics program to be delivered at the primary level.

Table 1

Pretest and Post-test of the Control and Experimental Group

	Control Group				**Experimental Group**			
	Pretest		Post-test		Pretest		Post-test	
	MPS	Description	MPS	Description	MPS	Description	MPS	Description
English	73	Did Not Meet Expectations	81	Satisfactory	76	Fairly Satisfactory	89	Very Satisfactory
Math	73	Did Not Meet Expectations	82	Satisfactory	75	Fairly Satisfactory	91	Outstanding
Science	73	Did Not Meet Expectations	83	Satisfactory	77	Fairly Satisfactory	90	Outstanding
Overall	**73**	**Did Not Meet Expectations**	**82**	**Satisfactory**	**76**	**Fairly Satisfactory**	**90**	**Outstanding**

Legend: Statistical Limits	**Descriptive Rating**
90-100	Outstanding
85-89	Very Satisfactory
80-84	Satisfactory
75-79	Fairly Satisfactory
Below 75	Did not meet Expectations (DE)

Experimental Group Pretest and Post-test Scores Difference

Table 2 reveals that the t-computed is greater than t-critical, therefore the null hypothesis is rejected. There is a significant difference in the test scores before and after the use of Two-Way Radio-Based Instruction with Self-Learning Guide Sheet as an approach to Modular Distance Learning in the experimental group. It can imply that the improvement of academic performance as taken from their summative scores in core learning areas is due to the implementation of the intervention. Teaching learners the necessary literacy skills increased their summative scores and eventually translates to the progress of academic performance.

The summative assessment or unit test are not mainly the measure of proving academic performance but were used numerical representation in the curriculum, it can be deduced from the results that remedial interventions for learners are one of the methods that may reduce the variance of achievement in the classroom and thus ensure that all students are progressing. Support teaching mechanism programs offer the possibility of focusing on those students who are lagging and teaching at an appropriate teaching method for their current level of skills. Ideally, such an intervention would increase their progress and decrease the heterogeneity of student learning levels in a given grade.

Moreover, it confirms that remedial instruction using the Two-Way Radio-Based Instruction with Self-Learning Guide Sheet as an innovation was implemented as the teacher recognized that a student requires temporary, additional, and specialist support for one or more core skills cannot be provided alone just by utilizing the printed SLMs. Accordingly, the provision of reading remediation with tutorial instruction based on the content of the SLMs, specifically in Science, Math, and English using print and nonprint resource materials through Self-Learning Guide Sheet and Two-Way Radio Based Instruction as an approach to Modular Distance Learning were adequate since the performance levels in the post test produced higher results than before the learner's received remediation. Being at first in the "Fairly Satisfactory" level, the learners exhibited their competencies in integrating several information sources. As a significant standard in their grade level, they can tackle more

complex issues. As a result, the students could comprehend simple taught phrases and restricted new phrases, including familiar vocabulary, convey fundamental survival needs and participate in specific everyday social discussions with some primary grammar control.

The study of Genlott and Gronlund (2013) substantiates the current research findings. They argue that learning to read and write is a fundamental ability that, sadly, not everyone acquires adequately. Furthermore, due to the massive increase in informational activities resulting from the Internet and other information technology-enabled opportunities, mathematical and scientific skills are becoming increasingly important to an increasing number of individuals, however, tremendous decline in these skills are evident in the implementation of the modular distance modality. This means that literacy education needs to improve to have better opportunities to learn to read and write in their early years so they can advance to academically performing learners.

Myrberg (2007) agrees with the current study's findings that early learning is critical; previous research has shown that children who fall behind in early reading and writing development have significant challenges in later school as texts become longer and more demanding and that greatly affect academic performance in other subject areas like Math, Science, and History. Given this condition, it is critical to employ more effective literacy-development strategies such as the use of Two-Way Radio alongside the Self-Learning Guide Sheet and Two-Way strategized with Press Talk Teach Teaching Strategy (PTTTS).

Cihon et al. (2008) cited in Cornthwaite's (2012) study that early intervention is critical for participants at risk for reading failure. It examined early intervention, particularly on reading remediation focused on phonics skills, comprehension, and fluency. Added in this study is the impact for learning outcomes which provides an integrated and balanced approach to reading remediations as part of the instructional structure of the program incorporating the critical elements across the curriculum concepts aligning the intervention with balanced literacy. Research by Cihon et al. (2008) found that remediation and guided instructions like the strategy used in Self-Learning Guide Sheet and Two-Way Radio Based Instruction in a Press Talk Teach Teaching Strategy (PTTTS) were necessary for improved

performance for literacy skills leading to academic progress and laying the foundations for lifelong learning.

Table 2

Difference in the Pretest and Post-test Scores of the Experimental Group

		Mean	t-computed	t-critical	p-value	Decision
English	Pretest	15				**Reject the Null**
	Post-test	18	7.87	2.14	0.00	**Hypothesis**
Math	Pretest	15				**Reject the Null**
	Post-test	18	7.12	2.14	0.00	**Hypothesis**
Science	Pretest	15				**Reject the Null**
	Post-test	18	6.79	2.14	0.00	**Hypothesis**

0.5 Level of Significance

Post-test Scores Difference Between the Control and Experimental Group

Table 3 presents difference in the post-test scores of learners between the control and experimental group. As revealed, there is a significant difference in the post-test between the control and experimental groups. This means that the use of Two-Way Radio Based Instruction with Self-Learning Guide Sheet is more effective than using printed modules.

The findings could imply that in Two-Way Radio-Based Instruction with Self-Learning Guide Sheet as an approach to Modular Distance Learning, the use of radio lessons motivates the learners if they are used in such a way as to stimulate learning. The radio, along with the printed material that guided the students as they follow along the lessons with the Press Talk Teach Teaching Strategy (PTTTS), simplified better communication and interaction between the learner and the teacher. Odera (2018) adds that technology intervention helps to provide opportunity to provide stimulating and rehearsing communicative situation to be encountered in remote learning. The researcher assumes that Self-Learning Guide Sheet and Two-Way Radio Based Instruction plays an extremely

vital role in the information & communication process that is prerequisite for academic development. Supporting this claim, according to McAnany (2017), he also reported that telecommunication would act as a catalyst for a surge in distance learning during a period in which face-to-face interaction pervaded the learners from achieving high academic performance.

Additionally, the study's findings are in congruence to Ho et al. (2019) about the ability of the interactive radio instruction to improve the quality of education is established and well documented as evaluations have yielded consistent and significant evidence that IRI can increase learning. Murphy et al. (2012) have found increases in achievement across subject matter, student ages and genders, and rural or urban location of the project while Leigh and Cash (2019) have statistically highlighted an increase in students' performances.

In a few studies that have analyzed the effectiveness of radio-based instruction using handheld radios or any other types as measured by learning gains over a series of lessons or grade levels, researchers have found that student achievement has increased progressively over time. In South Africa, for example, students who received fewer than 33 English in Action lessons improved by 6.7%; those who received between 34 and 66 lessons improved by 13% and those who received more than 66 programs improved by 24% (Leigh 2015). Similar results were found by Cash (2016) in Bolivia; evaluators found that between the average score of second graders using IRI Math jumped from 47.0 to 66.23%.

In the many regions in the Philippines, in the scenario of new normal environment, consistently strives to provide quality basic education that is accessible to every learner through the use of learning modality that is suited to address the needs of our clienteles. DepEd has included in its Blended Learning the use of radio to reach learners who have limited or no access to online and television-based lessons. Llego (2020) reported that the adoption of the learning modality in the Philippines is possible through series of consultations and discussions among DEPED personnel and external stakeholders during the development of the Learning Continuity Plan and has decided the modality of Modular Distance Learning Assisted by Two-Way Radio Handset since this is the only option suited

in the locality. To ensure that Modular Distance Learning is effective to pupils the reinforcement and assistance of Two-Way Radio Handset is recommended in order that the transfer of learning is possible with the guidance and support of the teachers, parents, partners and other stakeholders.

In Ragayan, Butig, Lanao del Sur, where access to electricity and television and cell phone signals are limited, teachers and students communicate with the help of two-way radios (Llego, 2021). On the other hand, GMA News (2020) broadcasts that with the help of the hand-held communication devices, the teachers in war-torn Lanao del Sur town gave lectures, while their students recited their answers and asked questions in real time. Wow Cordillera (2021) also supported that using 2-way radios as an alternative method of teaching to underprivileged students without access to the internet and television is encouraged by the government so that kids would no longer present to school to avoid being expose with the virus. Similarly, some teachers in Abra had been using walkie-talkies to their pupils to relay instruction on how to go with their module.

Table 3

Difference in the Post-test Scores Between the Control and Experimental Group

		Mean	**t-computed**	**t-critical**	**p-value**	**Decision**
English	Control	16				**Reject the Null**
	Experimental	18	3.62	2.06	0.00	**Hypothesis**
Math	Control	16				**Reject the Null**
	Experimental	18	4.20	2.06	0.00	**Hypothesis**
Science	Control	17				**Reject the Null**
	Experimental	18	3.39	2.07	0.00	**Hypothesis**

0.5 Level of Significance

Reflection

The researchers affirms that persistent low academic achievement of learners may sometimes attributed to teacher instructional strategies among others. Thus, instructional strategies used by teachers in teaching-learning process had significant influence on learners' academic achievement. As such, instructional strategies, for instance the Two-Way Radio with Self-Learning Guide Sheet, adopted by teachers at all levels of education in imparting knowledge and skills to the learners were determined by teachers' abilities, topic to be taught, learners age, available resources, and available space.

The researchers also substantiate that it is not enough for a teacher to teach the pupils topics in Science, Mathematics, English, and other subjects but instead look at other factors that affect their academic performance and literacy skills, as discussed in the context and rationale of this research. It is a fact that the level of academic performance of learners are quantified through the administration of summative assessments in written works, as well as performance tasks. For children to develop their full potentials, factors should be investigated to come up with solutions. One of these factors might be the low level of critical standards that they should have met early.

As a researcher, there is a need to look how teachers can teach students how to learn at their best by considering factors that might affect their performances. And then support their lacking through appropriate methods, approaches, and actions that aid them in developing target literacy skills. Several techniques can help students improve their performance while learning to read and write. Such devices include transparent print and nonprint materials for sharing texts and discussions and the manner and time teachers provide to their learners, which can all help with various milestones in the process in different ways. As a result, teachers are the greatest people to lead this learning.

This study demonstrates that teachers can and should be held accountable for assisting students in developing reading abilities. Indeed, several educational systems are working to ensure that everyone who works with young learners in classrooms and outside

of the classroom, such as parents, knows and understands how to assist them acquire literacy skills.

Conclusions and Recommendations

Conclusions

Based on the findings of the study, the following conclusions were derived:

1. Prior to the implementation of the Two-Way Radio-Based Instruction with Self-Learning Guide Sheet, the level of academic performance in English Math and Science of the control group is “Did Not Meet Expectations” and “Fairly Satisfactory” in the experimental group. After the implementation of the intervention, the level of academic performance of the learners improved to a “Satisfactory” level in the control group; and an “Outstanding” level in the experimental group.
2. There is a significant difference in the pretest and post-test scores of the learners in the experimental group.
3. There is a significant difference in the post-test scores of the learners between the control group and experimental group.

Recommendations

Based on the conclusions of this study, the following recommendations were made:

1. Since the employment of Two-Way Radio-Based Instruction with Self-Learning Guide Sheet was proven effective in this research, the use of radio broadcast should be improved on in open and distance learning in order to improve the efficiency of learning.
2. The ability of the teachers to use the instructional radio improves students’ academic achievement, hence, there is need for this to be used in teaching which can also be used to supplement, clarify, vitalize, emphasize, instruct, and enhance learning in the process of transmitting knowledge, ideas, skills, and attitude.

3. Working tools for Interactive Radio Instruction should be available at schools and up to date to be effective, each classroom should be equipped with working tools.
4. Professional development opportunities for all teachers should be exposed to Interactive Radio Instruction program. 5) Because of the nature and context of this research, future research should extend to incorporate a wider school population in the schools division.

Action Plan

School-based Learning Action Cell (LAC) sessions and Focus Group Discussions (FGDs) are powerful mechanisms in sharing and disseminating research findings. Therefore, the researchers shall conduct either of these mechanisms for its dissemination for the purpose of sharing best practices that could be adapted to address other similar issues. Another, the researchers plan to disseminate the research and advocate the conduct of research that would support or supplement the findings. If given the chance, the researchers will present this study to conferences or research forums in DepEd, research institutes, or organizations inviting research presenters.

Objective	Activities	Person/s involved	Target Date	Resources
To disseminate the result of the study	Develop brochures/flyers/infograhics presenting the result of the study highlighting the the Self-Learning Guide Sheet and Two-Way Radio Based Instruction as an approach to Modular Distance Learning	Researchers	September 2022	Printing materials
	Conduct LAC sessions on the use of the Self-Learning Guide Sheet and Two-Way Radio Based Instruction as an approach to Modular Distance Learning	Researchers, teachers	September to December 2022	Printing materials, venue, meals and snacks
	Present the result of the study in the District Research Conference	Researchers, participants of the congress	December 2022	Printing materials, computer
	Publish the result in the division website or any platform available for publication	Researchers Publishers	December 2022	Internet connection, computer

References

Alvarez, M. Y. (2021*). Issues and concerns of teachers in Mindanao State University-Sulu towards modular distance learning approach: An Analysis*. Indonesian Community Empowerment Journal, 1(2), 51-69. https://doi.org/10.37275/icejournal.v1i2.12

Beacco, J. C., Fleming, M., Goullier, F., Th ürmann E., & Volmer, H. (2015). *The language dimension in all subjects. A handbook for curriculum development and teacher training*. Council of Europe, Language Policy Unit. (Manuscript).

Carlson, S. (2003). *Using technology to deliver educational services to children and youth in environments affected by crisis and/or conflict*. USAID. Available from https://www.usaid.gov/sites/default/files/documents/2155/ICTs%20in%20Conflict%20Compendium%2 0FINAL.pdf

Cash. C. (2016). Media power and the development of media literacy: An adult educational interpretation. Harvard. Educational Review, 56(2), 151-171.

Chandar, U. and Sharma, R. (2013). *Bridges to effective learning through radio*. The International Review of Research in Open and Distance Learning, 4(1). http://www.irrodl.org/index.php/irrodl/article/view/118.

Dangle, R., Sumaong, D. (2020). *The implementation of modular distance learning in the Philippine secondary public schools*. Montessori Class Directress, University of the Cordilleras, Baguio City, Philippines https://www.dpublication.com/wp-content/uploads/2020/11/27-427.pdf

Dayagbil, F. Palompon, D. Garcia, L. Olvido M. (2021). *Teaching and learning continuity amid and beyond the pandemic.* Office of the University President, Palompon - Office of the Vice-President for Academic Affairs, Garcia-Center for Research and Development, Olvido - Office of the Board and University Secretary, Cebu, Philippines

EDC (2020). *Learning at home in time of crisis using radio: Interactive audio instruction repurposing toolkit: summary*. https://www.edc.org/learning-home-times-crisis-using-radio

Elliot, V. (2019). *The effectiveness of Interactive Radio Instruction (IRI) within selected primary schools in region number four*. https://www.researchgate.net/publication/319854646_The_effectiveness_of_Interactive_Radio_Instruction_IRI_within_selected_Primary_Schools

Evans, Norma & Pier, Daniel (2008) . *Interactive radio usage and its impact on grades 1 and 2 teachers and students* – Midterm Study of the Appui Technique aux Educateurs et Communautes (ATEC) Program, Madagascar. Education Development Center, Inc

GMA News and Current Affairs. (2020). Para makasabay sa distance learning, two-way radio ang ginamit na communication device ng ilang guro at mag-aaral sa Butig, Lanao del Sur. @gmanews · Broadcasting & media production company. https://www.facebook.com/gmanews/posts/10159424455241977.

Gronlund, Ake & Genlott Annika. (2012). *Improving literacy skills through learning reading by writing*: The iWTR method presented and tested. City of Sollentuna,70182 Örebro, Sweden

Ho, Jennifer, and Hetal Thukral. (2019) *"Tuned in to Student Success: Assessing the impact of Interactive Radio Instruction (IRI) for the hardest to Reach*." Education Development Center, Washington, DC

Irwin, J. F., Chabanne,J.C., et.al. (2015). *Improving literacy skills across learning*. Hungarian Institute for Educational Research and Development (HIERD)

Lawal, T. E. (2017). Think and do activity and its effect on the performance of pupils in primary science in selected primary schools in Zaria Municipality, Nigeria. Journal of Science and Mathematics Education, 3(1), 87-92

Leigh, S. and Cash, F.(2019). "*Effectiveness and methodology of Interactive Radio Instruction (IRI)*." In Alan Dock and John Helwig, eds., "Interactive Radio Instruction: Impact, Sustainability, and Future Directions." Education and Technology Technical Notes Series 4 (1). World Bank, Washington, D.C.

Leigh, S. (2015). *The use of educational radio for improving the quality of teaching and learning in government regional medium elementary schools*. In Consultation on National Policy on ICTs in School Education. Niger: Abuja.

Literacy Education. (2015). *Bridges to effective learning through radio*. The International Review of Research in Open and Distance Learning, 4(1) http://www.irrodl.org/index.php/irrodl/article/view/118.

Llego, M. (2021). *Online distance learning: the new normal in education. readiness: the key to ODL in the time of pandemic*. DepEd Click. https://www.facebook.com/depedclick/

Murphy, L. Cooke, T., & Romweber, G. (2012). *Radio nutrition education—Using the advertising techniques to reach rural families*: Philippines and Nicaragua. Washington, D.C.: Manoff International.

National Assessment of Educational Progress. (2014). "*Mapping state proficiency standards onto the NAEP Scales*,". Handbook of Classroom Assessment earning, Achievement, and Adjustment Educational Psychology. Pages 517-529

OECD (2010). PISA 2009 Results: *What students know and can do – student performance in reading, Mathematics and Science* (Volume I).

O'Halloran, K. L. (2005). *Mathematical discourse*. Language, symbolism, and visual images. London Continuum.

Perraton J., Creed, H., and Robinson, C. (2010). "*Applying new technologies and cost-effective delivery systems in basic education*." World Education Forum, Education for All 2000 Assessment. United Nations Educational, Scientific, and Cultural Organization (UNESCO).

Potter, Charles, and Adilia S. F. Silva, eds. (2002). "*Teachers in Action: Case studies of radio learning in South African primary schools*." Open Learning Systems Education Trust (OLSET), Teacher education guidelines: using open and distance learning, Paris: UNESCO. Retrieved from http://unesdoc.unesco.org/images/0012/001253/125396e.pdf (25August 2011)

Rotas, E. & Cahapay M. (2020). *Difficulties in Remote Learning: Voices of Philippine University Students in the Wake of COVID-19 Crisis*. Asian Journal of Distance Education. https://www.semanticscholar.org/paper/Difficulties-in-Remote-Learning3A-Voices-of-Students-Rotas-Cahapay/c49fc62bf61124bc1ab76f8eecdd4842cdac24d6

Spitzer, M.W.H. & Musslick, S. (2021). Academic performance of K-12 students in an online-learning environment for mathematics increased during the shutdown of schools in wake of the COVID-19 pandemic. PLoS ONE 16(8): e0255629. https://doi.org/10.1371/journal.pone.0255629

Singh,S. Malik, S. & Singh, P. (2016). Factors Affecting Academic Performance of Students. Education, Business Paripex Indian Journal Of Research.

William, M. Trochim, J. (2020). *Research methods knowledge base*. https://conjointly.com/kb/quasi-experimental-design.

Wow Cordillera. (2021). Cordillera News on new learning modality in the Philippines. WowCordillera. https://www.wowcordillera.com/

World Bank. (2005*). Improving education quality with Interactive Radio Instruction (IRI) Toolkit*. http://documents.worldbank.org/curated/en/288791468035958279/Improvingtheeducational-quality-with-interactive-radio-instruction-a-toolkit-forpolicymakers-andplanners

Financial Report

	A. SUPPLIES AND MATERIALS					
Activity	Item	Unit	Quantity	Estimated Cost	Total	ACTUAL COST
Implementation of the study and Preparation of Research Papers, Instructional Materials/Worksheets, and other documents	A4 Bond Paper	ream	10	250.00	2,500.00	2,500.00
	A4 Folder with fastener	pc	60	20.00	1,200.00	1,200.00
	Printer Ink Black	bottle	10	350.00	3,500.00	3,500.00
	Printer Ink Cyan	bottle	4	350.00	1,400.00	1,400.00
	Printer Ink Magenta	bottle	4	350.00	1,400.00	1,400.00
	Printer Ink Yellow	bottle	4	350.00	1,400.00	1,400.00
	USB Flash Drive	pc	1	1,000.00	1,000.00	1,000.00
	Plastic Envelope	pc	60	15.00	900.00	900.00
B. Domestic Travel Expenses						
Submission of First Tranche Deliverables	Courier/Private Vehicle		1	300.00	300.00	300.00
C. Food and other incurred expenses during the conduct of research						
D. Reproduction, Printing, and Binding Cost						
E. Communication Expenses for the Implementation / Conduct of the Study						
Implimentation of the study - Data Gathering/Collection, Preparation and submission of research papers and other documents	Internet Load of 3 proponents	card	9	500.00	4,500.00	4,500.00
	Load of 3 proponents (Smart/Globe)	card	9	500.00	4,500.00	4,500.00
F. Other Expenses						
					22,600.00	22,600.00

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