

Teachers' Perceptions on the Effectiveness of DepEd TV and Radio-Based Instruction in Teaching Mathematics Among Teachers in Cawayan East District

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Abstract

This study examined the effectiveness of DepEd TV and Radio-Based Instruction as alternative learning modalities in teaching Mathematics during the pandemic. Guided by the Department of Education's implementation of distance learning, the study aimed to determine teachers' perceptions regarding the accessibility, instructional delivery, and overall effectiveness of these broadcast-based modalities. A descriptive research design was utilized, employing survey questionnaires as the primary instrument for data gathering. The respondents of the study were Mathematics teachers involved in the implementation of DepEd TV and Radio-Based Instruction. Data were analyzed using appropriate statistical tools to determine the respondents' perceptions and the challenges encountered in the implementation process. Findings revealed that DepEd TV and Radio-Based Instruction contributed significantly to the continuity of Mathematics education, especially among learners with limited internet connectivity and access to digital devices. Teachers perceived these modalities as beneficial in supporting lesson delivery and learner access to educational content. However, several challenges affected the effectiveness of implementation, including poor signal reception, unstable electricity supply, limited availability of devices, and low learner engagement. The study also found that teachers' professional background and teaching experience influenced their perceptions of the effectiveness of the modalities. Based on the findings, the study concluded that broadcast-based instruction remains a valuable alternative learning strategy but requires strengthened technical, infrastructural, and instructional support to improve educational outcomes. The study supports Sustainable Development Goal (SDG) 4: Quality Education by promoting inclusive and accessible learning opportunities during emergencies and disruptions in traditional schooling. It also contributes to sustainable educational practices by strengthening alternative learning systems that support equitable access to education in underserved communities. The sustainability impact of the study lies in its potential to guide institutional policies and educational interventions that enhance resilience, accessibility, and continuity in basic education delivery.

Keywords: Alternative Learning Modalities, DepEd TV, Distance Education, Mathematics Education, Radio-Based Instruction, Remote Learning, Teacher Perceptions, Teaching Effectiveness

1. Introduction

Education is fundamental to social advancement and human development, particularly in Mathematics education where learners develop higher-order thinking and analytical skills. The demand for innovative pedagogical approaches increased as educational systems adapted to the challenges of the 21st century. The COVID-19 pandemic accelerated this transition when the World Health Organization (WHO) declared COVID-19 a global pandemic in March 2020, resulting in widespread school closures and a rapid shift to alternative learning delivery modes. In response, the Philippine Department of Education introduced alternative learning modalities such as DepEd TV and Radio-Based Instruction to support learning continuity. DepEd TV reportedly reached 13.91 million users, reflecting its relevance in Philippine education during the pandemic. These platforms aimed to deliver curriculum-aligned Mathematics lessons to learners with limited internet connectivity and digital resources. However, the transition to broadcast-based instruction created instructional challenges, especially in Mathematics, which traditionally depends on interaction, immediate feedback, and guided problem-solving. Studies on remote learning during the pandemic highlighted difficulties experienced by teachers, students, and parents in adapting to flexible learning systems. Treceñe (2021) discussed the challenges and adjustments encountered by Filipino learners and educators during remote learning implementation. Hodges et al. (2020) emphasized the distinction between emergency remote teaching and well-designed online learning, noting that emergency instructional modalities often lacked sufficient instructional preparation and support systems. Mathematics teachers in Cawayan East District experienced these instructional transitions firsthand. Their perceptions regarding the effectiveness, accessibility, and implementation challenges of DepEd TV and RBI provide valuable insights into the realities of broadcast-based Mathematics instruction. Understanding these experiences is important in improving future educational responses and ensuring effective Mathematics learning during crises and beyond.

Related literature and studies consistently emphasize the importance of pedagogical quality, teacher preparedness, learner engagement, and technological accessibility in distance learning environments. Traxler (2018) explained that distance learning has evolved significantly due to technological advancement and has become increasingly important in expanding educational access. Saykılı (2018) described the evolution of distance education and emphasized that each stage of educational technology development presents both opportunities and challenges. Research on educational technology in Mathematics education suggests that technology-supported instruction becomes effective when integrated with sound pedagogy and curriculum objectives. Verbruggen, Depaepe, and Torbeyns (2021) found that the effectiveness of educational technology in Mathematics depends on instructional integration and implementation quality. Watson and McIntyre (2020) also concluded that educational television can support student learning when aligned with appropriate pedagogical frameworks. Similarly, Chinelo Blessing Oribhabor (2020) reported that multimedia-supported Mathematics instruction improved learner engagement, comprehension, and retention.

Studies on radio-based learning emphasized its importance in underserved communities with limited digital infrastructure. Sarmah and Lama (2017) identified accessibility and affordability as major strengths of radio instruction, particularly in developing countries. UNESCO (2020) further noted that television and radio played critical roles in ensuring educational continuity during the pandemic, especially in geographically isolated areas. Local studies also highlighted the realities of implementing alternative learning modalities in the Philippines. Calimlim, De Guzman, and Villalobos (2021) found that teachers experienced difficulties adapting traditional instruction to alternative delivery modes, requiring flexibility, training, and institutional support. Santiago et al. (2021) stressed the importance of infrastructure, teacher readiness, and learner engagement in flexible learning implementation. Esteban and Joy (2021) discussed how the digital divide affected educational participation during the pandemic, reinforcing the significance of broadcast-based modalities in areas with limited internet access.

Several studies focused specifically on Mathematics instruction during distance learning. Adeeb and Hamadneh (2022) found that Mathematics teachers require adequate training and technological support to effectively deliver distance instruction. Friolo and Mutya (2020) emphasized that Mathematics teachers encountered unique difficulties in converting interactive lessons into alternative learning formats. Yayen and Marensil (2021) reported that radio-based instruction became effective when community support, quality content, and proper implementation were present. These studies collectively suggest that broadcast-based instruction can support Mathematics learning when properly designed, integrated, and supported by teachers and communities.

Globally, educational systems shifted toward remote and alternative learning modalities during the COVID-19 pandemic. Countries adopted online learning, educational television, radio instruction, and modular learning to ensure continuity of education. UNESCO (2020) recognized television and radio as practical learning solutions for areas with limited internet access, particularly in developing countries. Nationally, the Philippine Department of Education implemented DepEd TV and Radio-Based Instruction as part of its Learning Continuity Plan to address disruptions caused by the pandemic. These broadcast-based modalities became particularly important in rural and geographically isolated communities where digital connectivity remained limited. Locally, Cawayan East District represents a rural educational setting where internet access, digital devices, and technological infrastructure are limited. The district serves students from fishing, farming, and low-income households across coastal and inland communities. Variations in electricity supply, signal reception, and access to television and radio devices affect the implementation of broadcast-based instruction. These contextual conditions directly influence teachers' experiences and perceptions regarding the effectiveness of DepEd TV and RBI in teaching Mathematics.

This study is anchored on the Technology Acceptance Model (TAM) developed by Davis (1989), which explains that technology acceptance depends primarily on perceived usefulness and perceived ease of use. Granić and Marangunić (2019) affirmed the relevance of TAM in educational settings, particularly in understanding teachers' acceptance of technology-based instructional systems. Scherer, Siddiq, and Tondeur (2019) further supported TAM through meta-analytic findings showing that teachers' beliefs about educational technology influence their adoption and implementation practices. The study also integrates Rogers' Diffusion of Innovations Theory (2003), which explains how innovations spread within social systems based on relative advantage, compatibility, complexity, trialability, and observability. These concepts help explain how Mathematics teachers evaluate DepEd TV and Radio-Based Instruction as educational innovations. The integration of TAM and Diffusion of Innovations Theory provides a framework for understanding how demographic variables such as age, educational attainment, and teaching experience influence teachers' perceptions of broadcast-based Mathematics instruction. The framework also explains how instructional quality, accessibility, student engagement, and technical support shape teachers' acceptance and evaluation of these modalities. Although numerous studies have explored distance learning and educational technology, several gaps remain in the literature. First, many studies focus primarily on students' experiences, while fewer studies investigate teachers' perceptions regarding the effectiveness of broadcast-based Mathematics instruction. Second, most studies examine educational television and radio instruction generally rather than focusing specifically on Mathematics education, which requires conceptual understanding,

interaction, and problem-solving support. Third, there remains a need for context-specific studies within rural Philippine settings where infrastructure limitations significantly affect learning delivery. Fourth, limited studies compare teachers' perceptions of both DepEd TV and Radio-Based Instruction simultaneously. Finally, few studies investigate how demographic variables such as age, educational attainment, and teaching experience influence teachers' perceptions regarding broadcast-based learning effectiveness. This study addresses these gaps by examining the perceptions of Mathematics teachers in Cawayan East District regarding the effectiveness of DepEd TV and Radio-Based Instruction in terms of content quality, pedagogy, student engagement, learning outcomes, accessibility, and implementation challenges.

This study aligns primarily with SDG 4 – Quality Education by examining alternative learning modalities that support inclusive and equitable education during periods of educational disruption. The investigation of DepEd TV and Radio-Based Instruction contributes to improving access to quality Mathematics education, especially for learners in rural and underserved communities. The study also supports SDG 9 – Industry, Innovation and Infrastructure by exploring the use of broadcast technologies as innovative educational tools in areas with limited digital infrastructure. The findings may contribute to improving educational broadcasting systems and strengthening instructional delivery mechanisms.

Additionally, the study relates to SDG 10 – Reduced Inequalities because broadcast-based instruction provides educational opportunities for learners with limited access to internet-based learning platforms. By examining accessibility and implementation challenges, the study highlights issues affecting educational equity in disadvantaged communities. The research also contributes to SDG 17 – Partnerships for the Goals by emphasizing the importance of collaboration among schools, communities, educational authorities, and technology providers in supporting effective distance learning implementation.

The study contributes to educational sustainability by identifying strategies to strengthen instructional continuity during emergencies and disruptions. Understanding teachers' perceptions of DepEd TV and RBI may help improve long-term distance learning systems and ensure sustainable access to Mathematics education. The research also contributes to technological sustainability by examining the effectiveness of broadcast technologies in delivering educational content within resource-constrained settings. Insights from the study may guide the development of more inclusive and accessible educational technologies. In terms of socio-economic sustainability, the study recognizes the realities of rural communities where learners experience limitations in internet access, electricity, and digital resources. Improving broadcast-based learning systems may reduce educational inequalities and support community development. The study further contributes to policy and institutional sustainability by providing evidence-based recommendations for educational policymakers, school administrators, and curriculum developers regarding the enhancement of broadcast-based Mathematics instruction. Findings from the study may guide future educational planning, teacher training, infrastructure development, and learning continuity initiatives in both crisis and non-crisis contexts.

2. Material and methods

2.1 Research Design

The study utilized a descriptive quantitative research design to determine Mathematics teachers' perceptions regarding the effectiveness of DepEd TV and Radio-Based Instruction. Descriptive research was appropriate because it systematically described the characteristics, opinions, and experiences of the respondents without manipulating variables. The design enabled the researcher to collect numerical data related to teachers' demographic profiles and their perceptions of the effectiveness of broadcast-based instruction in Mathematics education. Statistical methods were used to analyze relationships and differences among variables.

2.2 Locale of the Study

The study was conducted in Cawayan East District, Division of Masbate Province, Philippines. The district consists of public elementary schools situated in rural and coastal communities where learners experience varying levels of access to educational technologies, electricity, and communication infrastructure. The district was selected because it implemented DepEd TV and Radio-Based Instruction during the COVID-19 pandemic as part of the Department of Education's Learning Continuity Plan. The locale provided an appropriate setting for examining the realities and challenges of broadcast-based Mathematics instruction in geographically isolated and resource-limited areas.

2.3 Respondents of the Study

The respondents of the study were public elementary Mathematics teachers assigned in Cawayan East District. These teachers were directly involved in the implementation of DepEd TV and Radio-Based Instruction during the pandemic. Their experiences and perceptions were considered essential in evaluating the effectiveness of the instructional modalities. The respondents varied in terms of age, sex, educational attainment, teaching position, and years of teaching experience.

2.4 Sample and Sampling Procedure

The study employed purposive sampling in selecting respondents. Mathematics teachers who had direct experience using DepEd TV and Radio-Based Instruction were chosen because they could provide relevant information regarding the implementation and effectiveness of these learning modalities. The sampling procedure ensured that participants possessed adequate knowledge and firsthand experience related to broadcast-based Mathematics instruction. The total number of respondents included qualified Mathematics teachers from the schools within Cawayan East District.

2.5 Research Instrument

The primary instrument used in the study was a researcher-made questionnaire designed to gather information regarding teachers' demographic profiles and perceptions of the effectiveness of DepEd TV and Radio-Based Instruction. The questionnaire consisted of two parts. The first part collected demographic information such as age, sex, educational attainment, teaching position, and years of teaching experience. The second part measured teachers' perceptions regarding content quality, instructional delivery, accessibility, student engagement, learning outcomes, and implementation challenges associated with DepEd TV and Radio-Based Instruction. The questionnaire items were formulated based on related literature and studies concerning distance learning, educational technology, and broadcast-based instruction. The instrument underwent validation by experts to ensure clarity, relevance, and content validity before administration. Necessary revisions were incorporated based on recommendations from validators.

2.6 Data Gathering Procedure

Before conducting the study, the researcher secured permission from the appropriate educational authorities and school administrators within Cawayan East District. After approval was granted, the researcher distributed the questionnaires to the selected respondents. The purpose of the study and instructions for answering the questionnaire were clearly explained to the participants. Respondents were given sufficient time to complete the instrument. After retrieval, the questionnaires were checked for completeness and accuracy. The collected data were organized, tabulated, and prepared for statistical analysis while ensuring the confidentiality and anonymity of the respondents.

2.7 Data Analysis Techniques

The collected data were analyzed using appropriate descriptive and inferential statistical tools. Frequency counts and percentages were used to describe the demographic profiles of the respondents. Weighted mean was utilized to determine the level of teachers' perceptions regarding the effectiveness of DepEd TV and Radio-Based Instruction. Inferential statistical methods were also employed to determine significant relationships and differences among variables based on respondents' demographic characteristics. Statistical analyses enabled the researcher to interpret the perceptions of Mathematics teachers regarding the implementation and effectiveness of broadcast-based instructional modalities in Cawayan East District.

2.8 Ethical Considerations

Ethical considerations were observed throughout the conduct of the study. Participation of respondents was voluntary, and informed consent was obtained prior to data collection. Respondents were assured that their responses would remain confidential and would be used solely for academic purposes. The anonymity of participants was protected, and all gathered information was handled responsibly and ethically.

3. Results and Discussion

3.1 Teachers' Perceptions on the Effectiveness of DepEd TV and Radio-Based Instruction

3.1.1 Demographic Profile of the Respondents

The findings revealed that the respondents varied in terms of age, sex, educational attainment, teaching position, and years of teaching experience. Most respondents were female teachers with several years of teaching experience and were actively involved in the implementation of DepEd TV and Radio-Based Instruction during the pandemic. The demographic profile suggests that experienced teachers played a significant role in adapting to alternative learning modalities during the health crisis. Their educational background and teaching experience may have contributed to their ability to implement broadcast-based instruction effectively. This supports the idea that teacher preparedness and professional experience influence the successful delivery of distance education programs.

3.1.2 Perceived Effectiveness in Instructional Delivery

The respondents generally perceived DepEd TV and Radio-Based Instruction as effective in delivering Mathematics lessons during the pandemic. Teachers observed that the programs helped maintain continuity of learning despite limited face-to-face interaction. The instructional materials were viewed as organized, understandable, and aligned with the curriculum standards prescribed by the Department of Education. The findings indicate that broadcast-based instruction became an important alternative learning modality during school closures. Teachers recognized its value in ensuring access to education among learners in remote and resource-constrained communities. The result supports previous studies emphasizing the importance of flexible learning systems in sustaining education during emergencies and disruptions.

3.1.3 Accessibility of DepEd TV and Radio-Based Instruction

The study found that accessibility remained one of the major strengths of DepEd TV and Radio-Based Instruction. Teachers noted that learners in areas with limited internet connectivity were still able to access lessons through television and radio programs. However, some respondents reported challenges related to unstable electricity supply, lack of devices, and limited broadcast coverage in certain communities. These findings suggest that broadcast-based learning modalities helped bridge educational gaps among learners who could not participate in online learning. The use of television and radio provided a more inclusive approach to distance education, particularly in rural communities. Nevertheless, infrastructural limitations continued to affect the consistency and quality of instructional delivery.

3.1.4 Student Engagement and Participation

The respondents observed varying levels of student engagement during the implementation of DepEd TV and Radio-Based Instruction. Some learners actively participated and completed assigned learning tasks, while others experienced difficulties maintaining motivation and focus without direct teacher supervision. Teachers also reported limited opportunities for immediate feedback and interaction. The findings imply that while broadcast-based instruction increased access to learning, maintaining learner engagement remained challenging. The absence of face-to-face interaction reduced opportunities for active participation and individualized support. This reflects existing literature emphasizing the importance of interaction, feedback, and learner support in distance education environments.

3.1.5 Learning Outcomes in Mathematics

Teachers perceived that DepEd TV and Radio-Based Instruction contributed positively to learners' understanding of Mathematics concepts. However, respondents also noted that some learners struggled with comprehension, problem-solving, and independent learning tasks due to limited teacher guidance and home learning support. The findings indicate that broadcast-based instruction served as a useful supplementary learning tool but may not fully replace traditional classroom instruction in developing higher-order mathematical skills. The result supports studies suggesting that learner achievement in distance education depends on instructional support, parental involvement, and accessibility of learning resources.

3.2 Challenges Encountered in the Implementation of Broadcast-Based Instruction

The study revealed several challenges encountered by teachers during the implementation of DepEd TV and Radio-Based Instruction. These included poor signal reception, inadequate access to television or radio devices, limited electricity supply, lack of parental support, and difficulties monitoring learners' progress and participation. Teachers also experienced challenges in assessing students' actual understanding of lessons delivered through broadcast media. These challenges demonstrate the limitations of implementing distance learning in geographically isolated and economically disadvantaged communities. Although broadcast-based instruction increased educational access during the pandemic, the effectiveness of implementation depended heavily on technological infrastructure, household support, and resource availability. The findings are consistent with studies highlighting inequalities in access to educational resources during emergency remote learning.

3.3 Relationship Between Respondents' Profile and Perceptions of Effectiveness

The findings showed that certain demographic variables were associated with differences in teachers' perceptions regarding the effectiveness of DepEd TV and Radio-Based Instruction. Factors such as teaching experience and educational attainment influenced how respondents evaluated instructional delivery, accessibility, and learner engagement. The results suggest that teachers with greater professional experience and advanced educational preparation may have adapted more effectively to alternative learning modalities. Their familiarity with instructional strategies and classroom management may have contributed to more positive perceptions of broadcast-based instruction. This supports the view that teacher competence and professional development are important factors in the successful implementation of distance education programs.

4. Conclusion & Recommendations

The study concluded that Mathematics teachers generally perceived DepEd TV and Radio-Based Instruction as effective alternative learning modalities during the pandemic, particularly in ensuring continuity of education among learners with limited internet access. The findings showed that these modalities supported instructional delivery and accessibility of Mathematics lessons; however, challenges such as poor signal reception, lack of devices, unstable electricity supply, and limited learner engagement affected their overall effectiveness. The study further revealed that teachers' professional background and teaching experience influenced their perceptions of the implementation and effectiveness of broadcast-based instruction.

It is recommended that the Department of Education strengthen the implementation of DepEd TV and Radio-Based Instruction by improving broadcast accessibility, providing adequate learning resources, and enhancing technical and infrastructural support in remote communities. Teachers should also be given continuous training and professional

development opportunities to improve the delivery of broadcast-based instruction and learner engagement. Furthermore, stronger collaboration among schools, parents, and local stakeholders is encouraged to support learners' participation and improve the overall effectiveness of alternative learning modalities.

Compliance with ethical standards

The authors declare no conflict of interest. This study complied with recognized ethical standards for human-participant research by ensuring voluntary participation with informed consent, the right to withdraw without penalty, and strict confidentiality through anonymous, secure, and aggregated data handling. Given the focus on psychological well-being, procedures were non-invasive, and safeguards were observed to minimize discomfort, with guidance to appropriate support services when needed, and required institutional permissions were secured for instrument use and access to academic records.

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