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Bridging Screens And Minds: Teachers' Experiences Of Video-Based Science Instruction

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Abstract — This study addressed the knowledge gap on teachers' lived experiences in implementing video-based instruction in science, particularly in resource- constrained rural settings like the Poona Piagapo District. Using a qualitative phenomenological design, it explored teachers' experiences, the meanings they assign to these, the themes that emerge, and the development of a strategic framework to improve implementation. Seven purposively selected public elementary science teachers with at least three years of experience participated during the 2025–2026 academic year. Data were collected through in-depth interviews and analyzed using Colaizzi's method, including extracting significant statements, formulating meanings, clustering themes, and validating findings through member checking. The results showed that teachers view video-based instruction as a transformative tool that enhances science teaching by making abstract concepts more concrete, increasing learner engagement, and requiring adaptive strategies to address technological constraints. Five major themes emerged: pedagogical transformation, visualization of abstract concepts, enhanced learner engagement, resilience amid constraints, and professional growth through collaboration.

The study developed the VBIS Framework (2026), which includes five domains: video pedagogy and lesson design, cognitive and visual learning design, digital readiness and infrastructure support, inclusive and differentiated video use, and professional learning and collaboration. This framework offers a structured yet flexible approach to integrating video-based instruction in science classrooms.

The findings emphasize the importance of teacher experience in shaping instructional innovation and contribute to the broader understanding of technology integration in education. The study also suggests that schools support teachers through localized video resources and professional development, while future research may examine the framework's effectiveness using quantitative or mixed- method approaches.

Keywords: science education, strategic framework, teacher experiences, video- based instruction

I. INTRODUCTION

In the education sector today, there is a crescendo of changes and the most important among them is technology in ensuring a global framework for on-going teaching and learning. As a global phenomenon, video-based learning has developed into a life-changing pedagogical tool transforming the presentation and perception of science teaching (Kim et al., 2022; Patil et al., 2022). All over the world, other bodies, such as UNESCO (2020), stressing the importance of multimedia and digital platforms to make science classrooms more inclusive, accessible, and engaging to the 21st-century learner-given that this kind of learner prefers interactive and flexible content. Finland, Japan, and Singapore have incorporated video-based instruction into their science curricula to foster inquiry- based, student-centered, and collaborative learning (Lai & Bower, 2020; Zhao & Yang, 2021). This trend enhances science education by promoting higher-order thinking skills and preparing learners for the demands of a digital society (OECD, 2021).

In the context of the Philippines, the Department of Education (DepEd) promotes technology-enhanced instruction to solve long-entrenched science achievement problems while adjusting to the blended and flexible learning environment brought about by the pandemic (DepEd, 2022; PIDS, 2021). These policies, among others, including Basic Education Development Plan 2030 and Inclusive Education Policy Framework, encourage innovative approaches, including video-based learning, to promote differentiated instruction, enhance science literacy, and reach out to learners with varying needs (DepEd Order No. 23, s. 2022). However, the implementation of video-based instruction in the Philippine school system is hindered by various barriers, particularly in economically challenged remote areas like Poona Piagapo District. Key issues include infrastructure gaps, limited teacher digital skills, and a mismatch between video content and the local curriculum (Luna & Tamayo, 2022; Castillo & Delos Reyes, 2023).

Most research on video-based science instruction has focused on learner achievement, cognitive outcomes, or technology acceptance (Chen et al., 2022; Macías & García, 2023). However, few studies explore the lived experiences of teachers using this method in Philippine public schools. Understanding these experiences is crucial to identify how video-based instruction is perceived, the challenges faced, and the coping strategies of both teachers and learners. These insights are vital for developing future policies and practices that are pedagogically sound and contextually relevant (Medina & Cruz, 2021; Villanueva & Santos, 2023).

Thus, the researcher aims to understand the lived experiences of teachers in implementing video-based instruction in science within the elementary schools of Poona Piagapo District, exploring their challenges, coping strategies, and insights to ultimately develop a strategic framework for its effective integration.

1.1 Statement of the Problem

This study aimed to understand the lived experiences of teachers in implementing video-based instruction in science. Specifically, it sought to answer the following questions:

1. How do the co-participants describe their experiences in implementing video-based instruction in science?
2. What significant meanings are derived from the testimonies of the co-participants?
3. What themes emerged from the significant testimonies of the co-participants?
4. Based on the findings, what strategic framework can be formulated to enhance the effectiveness of video-based instruction in science?

II. RESEARCH METHODOLOGY

The study used a qualitative phenomenological research design, specifically, it followed Colaizzi's Method (1978) to systematically analyze and interpret the teaching experiences of public elementary school science teachers in the Poona Piagapo District. Using Colaizzi's structured method, the researcher explored teachers' experiences with video-based science instruction, including its benefits, challenges, coping strategies, and recommendations for improvement, while preserving both authenticity and scientific rigor. The study was especially relevant in rural areas, where limited resources and varying teacher training levels shaped unique educational conditions, allowing deeper insights into technology use in science education beyond what quantitative research can provide.

2.1 Data Generation and Selection of Co-Participants

The study involved public elementary school science teachers from the Poona Piagapo District, a rural area with eight elementary schools and one integrated school. It focused exclusively on elementary-level science teachers, excluding learners and secondary teachers, under the supervision of a single school.

Administrator responsible for curriculum implementation and video-based science instruction. All elementary schools in the district were included because they represented the local public education system and provided diverse yet relevant experiences with video-based instruction, ensuring a comprehensive understanding of the phenomenon.

Science teachers were purposively selected based on specific criteria, including currently teaching science, having at least three years of experience using video-based instruction, regularly integrating videos into lessons, possessing basic technological tools, and being willing to share their experiences through interviews. This sampling approach ensured that the participants could provide rich and meaningful insights into the benefits, challenges, strategies, and realities of video-based science instruction in public elementary schools. Before data collection, all participants signed informed consent forms explaining the study's purpose, procedures, voluntary participation, and ethical protections. The researcher also secured approval from the school administrator and the Schools Division Office before conducting the study. Interviews were scheduled at convenient times, audio-recorded with permission, transcribed verbatim for thematic analysis, and conducted with full respect for participants' rights, privacy, and dignity.

2.2 Thematic Reflection

The study used Paul Colaizzi's phenomenological method for thematic analysis to systematically and credibly capture teachers' lived experiences while keeping their voices central to the research. The process involved repeatedly reading interview transcripts, extracting significant statements, interpreting meanings, organizing them into theme clusters, and developing both exhaustive descriptions and a fundamental structure of the phenomenon. To ensure validity and trustworthiness, the researcher applied member-checking, triangulation, and constant comparison so participants could verify the accuracy of the findings and confirm that their experiences were properly represented. Through thematic reflection, the analysis revealed not only the teachers' experiences with video- based science instruction but also the strategies they used to manage challenges in rural classroom settings. The findings contributed to the development of a practical science education framework tailored to the realities of the Poona Piagapo District. Ethical principles such as informed consent, confidentiality, anonymity, transparency, integrity, and researcher reflexivity were strictly observed throughout the study to protect participants and minimize bias.

III. RESULTS AND DISCUSSIONS

3.1 Research Question 1: Research Question 1: How do the co-participants describe their experiences in implementing video-based instruction in science?

This question sought to understand how the co-participants described their experiences in implementing video-based instruction as a transformative journey that reshaped their science teaching practices. The researcher highlighted the significant experiences shared by the co-participants and served as the foundation for identifying patterns across the narratives.

Co-participant 1 narrated the impact of video-based instruction on her pedagogical approaches and the enhancement of her relationship with students. She stated that students exhibited increased participation, posed more insightful questions, and demonstrated a genuine interest in the subject matter. The interactive nature of video viewing fosters discussions in the classroom. Videos enhance differentiated learning by providing content in both visual and auditory formats, thereby addressing diverse learner needs.

As revealed in the experiences of the seven (7) Science teachers , video- based instruction provides teachers with the ability to effectively communicate scientific concepts to their students. The use of video-based instruction has allowed for a transition away from traditional views of educator-centered teaching to more interactive student-centered approaches in the classroom. Teachers reported moving away from abstract teacher explanations in favor of concrete visual representations of concepts and ideas within the scientific realm. Representation through video-based instruction has increased access to scientific learning, created an engaging experience for students, and made science relevant to the student's world.

The transition to a more student-centered-based classroom using video-based instructional methods also appears to have created an increase in engagement, student interest and motivation on behalf of students. Students who were engaged with visual and interactive video elements displayed an increase in classroom participation, higher levels of inquiry, and levels of student motivation. Therefore, video-based instruction has provided the opportunity for cognitive understanding as well as affective engagement which promotes a more dynamic and responsive classroom environment. The participants also employed strategies such as the integration of pause-and-discuss strategies with guided questions and reflective activity. This suggests successful implementations of video-based professional learning will require intentional pedagogical design for the purposes of maximizing the students' learning outcomes.

The co-participants' experiences highlighted the continued challenges when implementing video-based professional learning in rural and poor environments. Significant challenges reported included a lack of stable internet service, power outages, and access to resources and technology. Despite established barriers, all co-participants exhibited an innate resilience and adaptability by engaging in video pre-downloading, using alternative devices for instructional purposes and changing found instructional methods for the development of video-based instructional learning. The resilience exhibited by the participants indicates that successful implementations of video-based professional learning are dependent upon the creativity, initiative and problem-solving abilities of the teachers involved, not on the technology or infrastructure.

In addition, the participants' reflections on video-based professional learning indicated its role in developing inclusive and differentiated learning environments. Participants described the advantages of visual learning and audio learning is being supported using video. Video-based instructional methods allow all students to experience the video-based materials at their own convenience and therefore, to support these learners with different types of experience levels. Additionally, some forms of contextual adaptations, including the use of local language translations and aligning video-based materials with a learner's existing experiences, are critical for increasing accessibility to, and enhancing the cultural relevance of, science education that are video-based.

Finally, their experiences revealed that video-based instruction also promotes the professional growth of teachers through increased collaborative practices. The co-development of instructional materials, sharing of video-based resources and the collaborative reflection of instructional practices has promoted the growth of collaborative and continuous learning cultures amongst the video-based instructional practitioners. Therefore, video-based instruction not only enhances classroom instruction but contributes to the development of professional communities among teachers.

3.2 Research Question 2: What significant meanings are derived from the testimonies of the co-participants?

From the significant statements shared by the co-participants, one of the first significant meanings that emerged is the transformation of traditional teachings into interactive and student-centered. They articulated the transformation in their roles from information providers to facilitators, emphasizing the active engagement of learners through the utilization of videos. From the co-participants' stories, visualization offered by videos is essential for teaching scientific concepts that are difficult to conceptualize or replicate in a classroom setting. Motion graphics, simulations, and real-life footage enable students to observe phenomena that are not effectively conveyed through textbooks or lectures, including molecular behavior, body systems, and natural events.

Moreover, the co-participants shared that videos stimulate curiosity and foster emotional connections that transcend cognitive learning. They noted that students demonstrated an enhanced comprehension of scientific concepts and exhibited empathy, moral awareness, and personal reflection when engaged with compelling visual narratives. Also, the science teachers indicated an increase in reflection, resourcefulness, and technological proficiency as they examined innovative methods for incorporating videos into their lessons. These accounts demonstrate the role of video integration in enhancing teacher professionalism and expanding learning access for students with diverse needs and backgrounds. This illustrates a shared growth mindset, wherein students and educators mutually benefit from collaboration, reflection, and inclusivity.

While video-based instruction offers many benefits to teachers, co- participants consistently reported challenges, including an unstable power supply, slow internet connectivity, and insufficient access to devices. These challenges, however, fostered resilience and creativity in educators. Rather than perceiving limitations as obstacles, they pursued pragmatic solutions downloading materials beforehand, arranging backup equipment, and investigating offline teaching methodologies. These examples illustrate a culture of adaptability in challenging environments. Teachers demonstrate a commitment to providing effective instruction despite technological limitations. This highlights the role of professional commitment and improvisation in facilitating the ongoing implementation of video-based instruction, even in difficult contexts.

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3.3.Research Question 3: What themes emerged from the significant testimonies of the co-participants?

From the stories of seven (7) co-participants in the municipality of Poona Piagapo, Lanao del Norte Division regarding the use of video-based instruction in teaching Science, this study identified five (5) main themes: transformation of traditional teaching into interactive and student-centered learning, visualization enhances comprehension of abstract scientific ideas, resilience and creativity amid technological constraint, curiosity, participation, and reflection through emotional and moral engagement, and professional growth, inclusivity, and collaboration through video integration.

3.4. Research Question 4: Based on the findings, what strategic framework can be formulated to enhance the effectiveness of video-based instruction in science?

The VBIS Framework (2026) was developed based on the five emergent themes derived from the lived experiences of the co-participants. These themes served as the foundation for identifying key domains of implementation. Each domain reflects a specific aspect of teachers' experiences and represents a practical area where video-based instruction can be effectively applied. The framework ensures that instructional practices are grounded in actual classroom realities rather than theoretical assumptions.

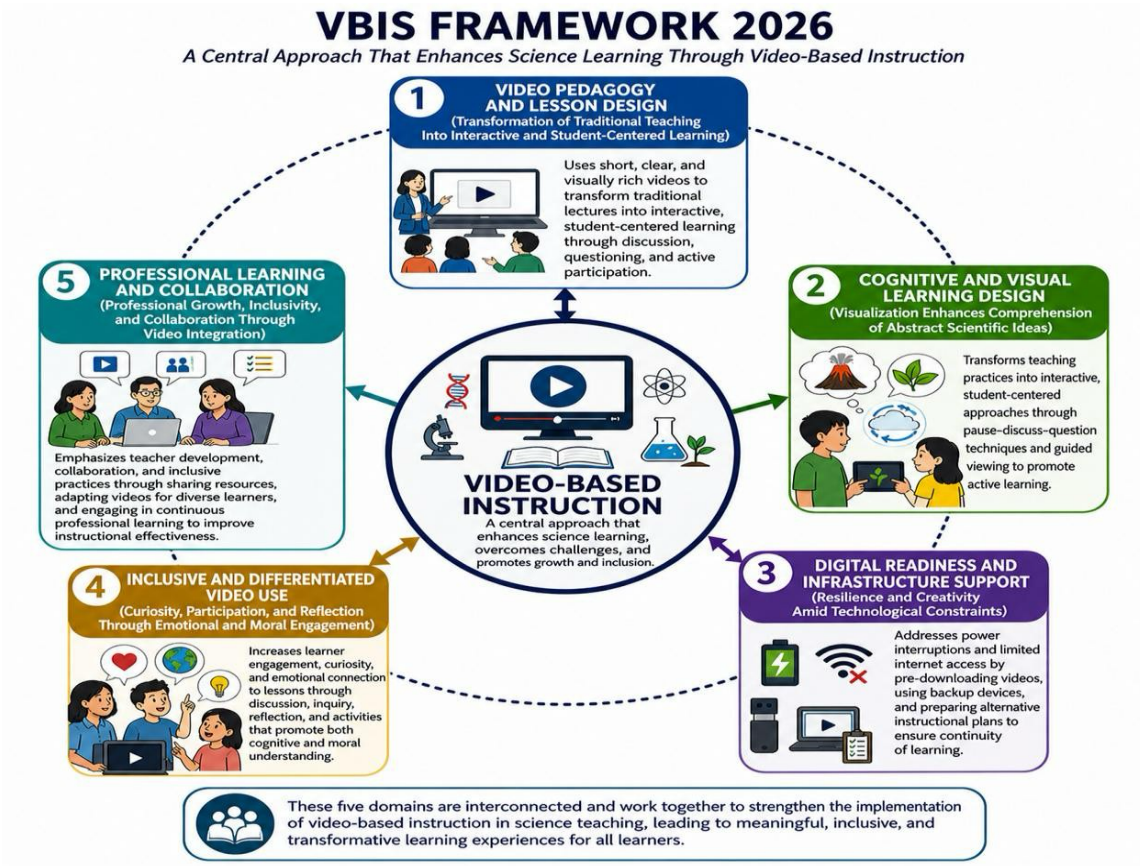

FIGURE 1
VBIS FRAMEWORK (2026)

The VBIS Framework (2026) was developed based on the five emergent themes derived from the lived experiences of the co-participants. As illustrated in the thematic map, video-based instruction functions as a central instructional approach supported by interconnected dimensions: transformation of teaching practices, visualization of scientific concepts, learner engagement and emotional participation, resilience amid technological constraints, and professional growth through collaboration and inclusivity.

These themes served as the foundation for identifying key domains of implementation. Each domain reflects a specific aspect of teachers' experiences and represents a practical area where video-based instruction can be effectively applied. The framework ensures that instructional practices are grounded in actual classroom realities rather than theoretical assumptions.

Overall, the VBIS Framework (2026) presents a structured yet flexible model that integrates pedagogy, visualization, engagement, resilience, and collaboration. It translates the lived experiences of teachers into practical strategies that can enhance science teaching, particularly in resource-constrained environments.

Implementation of the VBIS Framework

The VBIS Framework (2026) may be implemented through a structured and context-responsive approach:

First, teachers may begin by selecting and designing appropriate video materials aligned with lesson objectives, ensuring that content is clear, relevant, and visually effective.

Second, during classroom implementation, teachers may apply interactive strategies such as pausing videos for discussion, asking guiding questions, and encouraging students to reflect on what they observe. This ensures that learners actively engage with the content rather than passively watching.

Third, schools may support implementation by addressing technological limitations through offline access to videos, provision of basic equipment, and shared resource systems among teachers.

Fourth, inclusive practices may be incorporated by adapting video content to learners' needs, such as translating explanations into local languages and allowing flexible pacing through replay and review.

Finally, continuous evaluation and collaboration may be conducted through peer sharing, reflection, and feedback to improve the effectiveness of video-based instruction over time.

IV. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

1. Video-based instruction fundamentally alters science pedagogy, shifting from traditional teacher-centered lecturing to interactive, student-centered facilitation, where co-participants engage collaboratively. RP1–RP7 consistently transitioned from curiosity-driven experimentation to systematic pause-discuss-predict cycles, which stimulated inquiry, increased engagement, and modernized classroom practices in resource-limited environments.

2. The use of strategically selected videos for visualization effectively translates abstract scientific concepts such as molecular motion, body systems, photosynthesis, and natural cycles—into concrete and comprehensible forms. This approach bridges the gaps between theory and reality, enhances retention in the absence of laboratory resources, and directly affirms co-participants' experiences, leading to improved conceptual understanding.

3. Videos promote multidimensional engagement by combining cognitive inquiry with emotional and moral resonance, as demonstrated by students' curiosity-driven questioning and empathetic responses to climate change documentaries and maternal health videos. This approach fosters values formation, environmental awareness, and reflective participation that extends beyond mere factual learning.

4. In the context of infrastructural challenges such as power outages and connectivity issues, educators exhibit resilience by employing offline strategies. They foster inclusivity through local translation and professional collaboration via peer sharing, thereby constructing adaptive and equitable science education systems that support innovation across various classrooms in the Philippines.

4.2 Recommendation

Considering the findings and conclusions of this study, the following recommendations are presented.

1. School administrators may create centralized offline video repositories categorized by DepEd competencies and grade levels, implement systematic weekly download protocols utilizing urban connectivity hubs, and provide classrooms with backup devices such as laptops, portable speakers, external drives as well as contingency plans for power interruptions to institutionalize the resilience and infrastructural adaptation strategies consistently.

2. Science educators may implement pause-discuss-predict cycles, which include pre-viewing questions to stimulate curiosity, intentional video pauses for clarifying concepts and eliciting predictions, and competency-aligned hands-on follow-up activities. This approach aims to replicate the pedagogical shift from traditional lecturing to interactive, student-centered facilitation evident in all co- participants' classrooms.

3. Division offices may prioritize training for pedagogical video integration, focusing on visualization techniques for abstract processes such as molecular motion, body systems, and natural cycles. This training should also address cognitive load management using 3–7-minute segmented videos and facilitate emotional-moral reflection prompts. Additionally, mandatory re-echo sessions are essential to ensure equitable dissemination of best practices derived from co- participants.

4. Teachers are encouraged to adopt inclusive video adaptation strategies. These may encompass real-time local language translation, such as Maranao explanations, opportunities for self-paced rewatching tailored to diverse learners, and varied response formats including concept maps, drawings, and role-plays. Such measures

aim to operationalize the multimodal access and equity successes attained with students facing reading challenges and those from linguistically diverse backgrounds.

5. Future researchers are encouraged to undertake quasi-experimental validation studies of the VBIS Framework in comparison to traditional instruction. These studies may assess impacts related to all four research questions such as pedagogical transformation, visualization effectiveness, engagement depth, and framework scalability. Additionally, it is important to investigate longitudinal effects on scientific literacy, generalizability between rural and urban contexts, and applicability to other STEM disciplines.

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