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TABLE OF CONTENTS

TABLE OF CONTENTS

SUFFICIENCY AND UTILIZATION OF INSTRUCTIONAL MATERIALS IN THE TEACHING OF TECHNICAL ENGLISH 2 FOR CRIMINOLOGY STUDENTS IN THE PROVINCE OF CAPIZ

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ABSTRACT

This study examines the sufficiency and utilization of instructional materials in the teaching of Technical English 2 for Criminology students in the province of Capiz during the academic year 2022–2023. The research involved 23 respondents, comprising 18 course facilitators and 5 librarians from participating higher education institutions. Analysis focused on two dimensions: the availability of instructional forms and their frequency of utilization. Findings reveal critical gaps in the availability of essential legal documents, including the Affidavit of Resting Officer, Affidavit of Witness, and Application/Petition to Wire Tapping, among others. Furthermore, many existing materials are underutilized, showcasing a misalignment between available resources and classroom practice. These results brought to light the urgent need for the development of comprehensive, updated instructional materials aligned with current police and legal standards. In addition, faculty development programs are recommended to enhance educators' capacity to integrate diverse instructional forms effectively. Continuous curriculum evaluation and improvement is also essential to ensure that Technical English 2 meets the practical and professional needs of Criminology students. Through systematically targeting the identified gaps, this study provides actionable insights to strengthen Criminology education, equipping students with the technical writing and legal documentation skills necessary for professional competence in law enforcement and related fields.

INTRODUCTION

Instructional materials are essential for enhancing teaching effectiveness and optimizing student learning outcomes. They structure lesson delivery, reinforce comprehension, and facilitate differentiated instruction by making abstract concepts tangible (Abdulrahaman et al., 2020). Well-designed materials also increase student engagement and support the development of discipline-specific competencies in higher education (Rahman & Andini, 2021). Contemporary research emphasizes that up-to-date, adequate, and contextually relevant instructional resources are indispensable for achieving curriculum objectives and maintaining quality assurance in academic programs (Darmawan, 2022). Conversely, outdated or insufficient materials limit instructional effectiveness and adversely affect student performance (Lestari & Widjajanti, 2020).

In Criminology education, Technical English 2 is a core course that equips students with essential competencies in technical and legal documentation, including police reports, affidavits, blotters, and case documentation. The literature on English for Specific Purposes (ESP) emphasizes that effective instruction in specialized writing requires materials that are authentic, field-based, and aligned with professional standards (Basturkmen, 2019; Paltridge & Starfield, 2016). While general English instruction may be sufficient for broad writing skills, Technical English for Criminology demands resources grounded in law enforcement practices (Cunningham, 2020). Research on police documentation further shows the need for standardized, accurate, and skills-oriented writing instruction to mitigate recurring errors in official reports (Estrellado & Alcaide, 2021).

Despite the recognized importance of Technical English 2, there is limited empirical evidence on the availability, sufficiency, and utilization of instructional materials for this course in the Philippine Criminology context. International studies have examined instructional material adequacy in general English and ESP courses (Kılıçkaya & Krajka, 2018; Refnaldi & Ardi, 2020), yet no local research has systematically evaluated Technical English resources for Criminology students. This gap is particularly significant in provincial higher education institutions, where challenges in resource provision, material updating, and alignment with professional standards persist (Tria, 2020). The need for adequate instructional materials is further reinforced by national standards, including CHED Memorandum Order No. 20, s. 2013 on Revised Policies and Standards for the Bachelor of Science in Criminology, which mandates competency-based instruction in legal documentation, and accreditation requirements from AACCUP and other recognized bodies that emphasize resource sufficiency and curriculum relevance.

Resolving these gaps, this study investigates the sufficiency and utilization of instructional materials used in Technical English 2 across higher education institutions in the Province of Capiz during Academic Year 2022–2023. Through assessing both the percentage of sufficiency and the frequency of utilization, the research provides evidence-based insights to guide instructional planning, material development, and curriculum enhancement. Strengthening instructional resources for Technical English 2 not only improves academic outcomes but also prepares future law enforcers to produce accurate, clear, and legally sound documentation. Consequently, this study holds significant implications for educators, curriculum developers, and law enforcement agencies alike.

Statement of the Problem

This study aimed to assess the sufficiency and utilization of instructional materials used in teaching Technical English 2 to Criminology students in the Province of Capiz.

Specifically, it sought to answer the following questions:

1. What is the level of sufficiency of the instructional materials used in teaching Technical English 2?
2. What is the frequency of utilization of these instructional materials among course facilitators?

The results of this study are expected to guide the development, improvement, and selection of more relevant instructional materials that address the specific needs of Criminology students and enhance their competencies in technical and legal writing.

METHODOLOGY

Research Design

This study employed a descriptive research design, which systematically outlines the characteristics of a population, phenomenon, or situation without manipulating variables or testing hypotheses. Descriptive research enables researchers to gather data through surveys, observational techniques, or case studies to answer essential questions about how, when, where, and what a phenomenon is (Heath, 2023). This design was deemed appropriate for the present study because it allowed for an in-depth examination of the sufficiency and utilization of instructional materials in the teaching of Technical English 2, providing a clear snapshot of current practices without influencing them.

Respondents

The respondents of this study consisted of course facilitators of Technical English 2 and librarians from institutions offering the Bachelor of Science in Criminology program in the province of Capiz. Participants were drawn from five higher education institutions: Capiz State University – Dayao Satellite College (one librarian and three course facilitators), Capiz State University – Dumarao Satellite College (one librarian and two course facilitators), Filamer Christian University (one librarian and three course facilitators), HerCor College (one librarian and four course facilitators), and Colegio de la Purisima Concepcion (one librarian and seven course facilitators). In total, the study included 23 respondents, comprised of 18 course facilitators and five librarians. Given the relatively small and well-defined population, total population sampling was employed. This sampling technique involves including all members of the population in the study, which is appropriate when the population size is manageable and ensures that the data reflect the full scope of experiences and perceptions (Sugiyono, 2007).

Data were collected using a researcher-made survey questionnaire developed in alignment with CHED Memorandum Order No. 05, series of 2018, which sets forth the policies, standards, and guidelines for the Bachelor of Science in Criminology program (Commission on Higher Education, 2018). This ensured that the items reflected official curricular and competency requirements for criminology education. The survey was administered via Google Forms for ease of access and data management. The instrument was structured into three parts: Part 1 collected respondents' sociodemographic information, including age, sex, affiliation and role in the university; Part 2 assessed the sufficiency of instructional materials, asking respondents to indicate whether specific instructional forms were available in their institution; and Part 3 measured the frequency of utilization of these instructional materials in teaching Technical English 2 using a three-point scale: frequently, sometimes, or never.

The survey items covered 21 common instructional forms used in technical and legal writing for criminology education, including affidavits, petitions, memoranda, and other legal documents. To ensure validity and clarity, the instrument underwent expert validation by faculty members experienced in Technical English and Criminology instruction. A pilot test was also conducted with a small group of facilitators not included in the main study to refine item clarity and usability. Data gathered from the survey were analyzed using frequency counts, percentages, and mean calculations, providing a quantitative summary of both the sufficiency and utilization of instructional materials.

Statistical Treatment

To determine the sufficiency and utilization of instructional materials in the teaching of Technical English 2, quantitative descriptive statistics were employed. For sufficiency, the availability of each instructional form was expressed as a frequency and percentage, indicating how many respondents confirmed the presence of each material. For utilization, each form's frequency of use was quantified using three categories: Frequently, Sometimes, and Never. These categories were assigned numerical values (Frequently = 3, Sometimes = 2, Never = 1) to allow for the calculation of a mean utilization score for each instructional form.

FINDINGS

Table 1. Sufficiency of Instructional Materials in Teaching Technical English 2 (n = 23)

Instructional Forms	Yes, n (%)	No, n (%)
1. Affidavit	7 (30.4)	16 (69.6)
2. Affidavit of Arresting Officer	2 (8.7)	21 (91.3)
3. Affidavit of Witness	3 (13.0)	20 (87.0)
4. Application for Search Warrant	5 (21.7)	18 (78.3)
5. Application/Petition to Wire Tapping	3 (13.0)	20 (87.0)
6. Complaint – Any Crime/s	9 (39.1)	12 (63.2)
7. Affidavit of Resistance	3 (13.0)	20 (87.0)
8. Rejoinder Affidavit	1 (4.3)	22 (95.7)
9. Counter Affidavit	3 (13.0)	20 (87.0)
10. Affidavit for NBI Clearance	2 (8.7)	21 (91.3)
11. Final Investigation Report	8 (34.8)	15 (65.1)
12. Affidavit of Undertaking	10 (52.6)	13 (68.4)
13. Affidavit of Loss	23 (100)	0
14. Deposition of Witness	2 (8.7)	21 (91.3)
15. Memo for Preliminary Investigation	5 (26.3)	18 (78.3)
16. Motion for Reconsideration	1 (4.3)	22 (95.7)
17. Notice of Appeal	0	23 (100)
18. Commitment Order	1 (4.3)	22 (95.7)
19. Petition/Application for Compulsory Confinement for Drug Dependent	0	23 (100)
20. Petition/Application for Voluntary Confinement for Drug Dependent	1 (4.3)	22 (95.7)
21. Petition/Application for Compulsory Confinement for Drug Dependent thru Representation	1 (4.3)	22 (95.7)

Note. "Yes" indicates the instructional material was available; "No" indicates it was not available or scarce.

Table 1 presents the perceived sufficiency of instructional materials in the teaching of Technical English 2 among 23 respondents, including 14 course facilitators and 9 librarians from the participating

colleges and universities. The data reveal substantial disparities in the availability of instructional forms, which are essential for developing technical writing competencies in Criminology students.

The findings show that the Affidavit of Loss was the only form reported as fully available (100%), indicating its central role in instruction and familiarity among faculty and students. In contrast, several forms, particularly Notice of Appeal, Petitions for Compulsory or Voluntary Confinement of Drug Dependents, and Motion for Reconsideration, had extremely low availability (0–4.3%). Similarly, critical forms such as the Affidavit of Arresting Officer (8.7%), Affidavit of Witness (13%), and Application/ Petition to Wire Tapping (13%) were insufficiently available. These results highlight a serious deficiency in instructional resources, which is particularly alarming considering that Technical English 2 is a major subject within the Criminology curriculum. This subject equips students with practical skills in legal documentation and technical writing that are directly assessed in board examinations and are essential for professional practice (Basturkmen, 2019; CHED, 2019; Paltridge & Starfield, 2016).

The low availability of specialized forms raises concerns about students' preparedness for both academic and professional contexts. Without access to critical legal documents, students may graduate with gaps in their ability to perform legally compliant documentation, potentially compromising their performance in board exams and professional duties as law enforcement officers (Cunningham, 2020; PNP Training Manual, 2022). The scarcity of materials also risks reinforcing inequities in learning, where only some students may have exposure to these essential documents, limiting their ability to develop core competencies in technical legal writing (Estrellado & Alcaide, 2021).

Even moderately available forms, such as the Affidavit (30.4%) and Complaint – Any Crime/s (39.1%), reveal that access is far from sufficient for consistent instructional use. This scarcity underscores a misalignment between curriculum requirements and available resources, echoing challenges commonly faced in provincial higher education institutions in the Philippines, including limited funding, inadequate faculty training, and resource constraints (Tria, 2020; Darmawan, 2022).

The findings suggest a strong need for strategic curriculum planning and resource development. While availability alone is not sufficient to guarantee effective learning, it is a necessary precondition. Research in ESP emphasizes that students need authentic, readily accessible instructional materials to develop proficiency in technical tasks, especially in fields with high-stakes applications like law enforcement (Paltridge & Starfield, 2016; Rahman & Andini, 2021). Without such access, even competent instructors may struggle to provide meaningful practice opportunities, further widening the gap between classroom learning and professional expectations.

The implications are profound. The unavailability of technical legal forms not only limits instructional effectiveness but also endangers the professional readiness of graduates. Technical English 2 serves as a foundation for producing legally accurate and procedurally correct reports, skills that are explicitly tested in licensure examinations and required in practical fieldwork. The lack of adequate instructional materials may therefore directly impact students' exam performance and career readiness, making this an urgent issue for curriculum developers, educational administrators, and policymakers alike (CHED, 2019; PNP Training Manual, 2022; Estrellado & Alcaide, 2021).

The results in Table 2 reveal a critical insufficiency of instructional materials in Technical English 2, particularly for forms associated with specialized legal procedures. The findings are alarming, given the subject's status as a major course with direct relevance to board exams and professional practice. Resolving these gaps requires updating and expanding instructional materials, providing faculty development programs to enhance effective utilization, and ensuring alignment between curriculum content, legal standards, and professional competencies. Doing so is essential not only for improving teaching and learning outcomes but also for ensuring the professional preparedness of future Criminology graduates (Basturkmen, 2019; Cunningham, 2020; Paltridge & Starfield, 2016).

Table 2. Frequency of Utilization of Instructional Materials in the Teaching of Technical English 2 (N = 23)

Instructional Forms	Frequently n (%)	Sometimes n (%)	Never n (%)
1. Affidavit	3 (13%)	11 (47.8%)	9 (39.1%)
2. Affidavit of Arresting Officer	2 (8.7%)	6 (26.1%)	15 (65.2%)
3. Affidavit of Witness	2 (8.7%)	4 (17.4%)	17 (73.9%)
4. Application for Search Warrant	0	8 (34.8%)	15 (65.2%)
5. Application/Petition to Wire Tapping	0	6 (26.1%)	17 (73.9%)
6. Complaint – Any Crime/s	1 (4.3%)	12 (52.2%)	10 (43.5%)

7. Affidavit of Resistance	0	6 (26.1%)	17 (73.9%)
8. Reply Affidavit	0	6 (26.1%)	17 (73.9%)
9. Rejoinder Affidavit	0	4 (17.4%)	19 (82.6%)
10. Counter Affidavit	0	6 (26.1%)	17 (73.9%)
11. Affidavit for NBI Clearance	0	10 (43.5%)	13 (56.5%)
12. Affidavit of Undertaking	0	6 (26.1%)	17 (73.9%)
13. Affidavit of Loss	1 (4.3%)	8 (34.8%)	14 (60.9%)
14. Deposition of Witness	0	5 (21.7%)	18 (78.3%)
15. Memo for Preliminary Investigation	0	7 (30.4%)	16 (69.6%)
16. Motion for Reconsideration	0	6 (26.1%)	17 (73.9%)
17. Notice of Appeal	0	6 (26.1%)	17 (73.9%)
18. Commitment Order	0	3 (13%)	20 (87%)
19. Petition/Application for Compulsory Confinement (Drug Dependent)	1 (4.3%)	5 (21.7%)	17 (73.9%)
20. Petition/Application for Voluntary Confinement (Drug Dependent)	0	3 (13%)	20 (87%)
21. Petition/Application for Compulsory Confinement thru Representation	0	3 (13%)	20 (87%)

Note. Respondents included 14 course facilitators and 9 librarians from participating colleges and universities.

Table 2 presents the perceived frequency of utilization of instructional materials in the teaching of Technical English 2 as reported by 23 respondents, including 14 course facilitators and 9 librarians. The data reveal a troubling pattern: many critical legal documents are infrequently or never used in instruction, raising concerns about the preparedness of students for both board examinations and professional practice in law enforcement.

The findings indicate that a significant number of instructional forms, including Affidavit of Arresting Officer, Affidavit of Witness, Application for Search Warrant, Application/Petition to Wire Tapping, Affidavit of Resistance, Rejoinder Affidavit, Counter Affidavit, Affidavit for NBI Clearance, Affidavit of Undertaking, Deposition of Witness, Memo for Preliminary Investigation, Motion for Reconsideration, Notice of Appeal, and Petitions/Applications for Compulsory or Voluntary Confinement of Drug Dependents, were reported as never frequently utilized (0%). This low integration into teaching practices is particularly alarming given that Technical English 2 is a major subject in the Criminology curriculum, where mastery of legal forms is essential for accurate documentation, report writing, and procedural compliance (Basturkmen, 2019; Paltridge & Starfield, 2016).

Several forms, such as Complaint – Any Crime/s, Affidavit of Loss, and Petition/Application for Compulsory or Voluntary Confinement, were sometimes used but not consistently incorporated. While this represents a moderate level of engagement, the sporadic utilization showcases a missed opportunity for students to gain sufficient hands-on experience with these essential legal documents. Research in English for Specific Purposes (ESP) emphasizes that repeated exposure and practice with authentic materials are critical for skill development and procedural accuracy (Rahman & Andini, 2021; Paltridge & Starfield, 2016).

The implications of these findings are significant. The lack of frequent utilization of key instructional materials may contribute to gaps in students' technical writing competence, leaving them underprepared for board examinations and real-world legal tasks. Board exams for Criminology explicitly assess the ability to draft and interpret legal documents correctly, and inadequate exposure during instruction can compromise both performance and professional readiness (Cunningham, 2020; PNP Training Manual, 2022). The results also suggest a potential disconnect between resource availability and instructional integration. Even when materials are available, they may not be sufficiently utilized due to a lack of instructor familiarity, training, or curricular alignment (Estrellado & Alcaide, 2021; Tria, 2020).

Resolving this gap requires a multi-pronged strategy. First, institutions must ensure that critical instructional materials are not only available but actively integrated into classroom activities. Faculty development programs, workshops, and training sessions can equip instructors with the knowledge and confidence to utilize these forms effectively, fostering active learning and skill acquisition (Basturkmen, 2019; Rahman & Andini, 2021). Second, curriculum developers should reassess course design to align instructional materials with practical requirements, including board exam competencies and real-world legal procedures. Embedding these materials into structured exercises, simulations, and assignments will allow students to develop procedural fluency and technical writing skills essential for their future roles.

The combination of sufficiency (availability) and utilization data shows a critical challenge in Technical English 2 instruction. Forms that are either scarce or underutilized, such as the Affidavit of Wit-

ness, Application for Search Warrant, and Notice of Appeal, represent key gaps that may hinder students' preparation for licensure and professional duties. Solving these deficiencies is urgent, as Technical English 2 is a major subject that forms the foundation for professional competencies in report writing and legal documentation, directly influencing success in board examinations and field performance (Basturkmen, 2019; Cunningham, 2020; CHED, 2019).

The findings from Table 2 reveal a serious underutilization of instructional materials in Technical English 2, highlighting an urgent need for intervention. Through ensuring frequent integration of legal forms into teaching, providing faculty support, and updating curricular frameworks, institutions can enhance the quality of instruction, student learning outcomes, and professional readiness. Regular evaluation of both sufficiency and utilization will be essential to maintain alignment with evolving educational and professional standards in criminology (Paltridge & Starfield, 2016; Rahman & Andini, 2021).

CONCLUSIONS

This study investigated the sufficiency and utilization of instructional materials in the teaching of Technical English 2 for Criminology students in the Province of Capiz. The findings provide a clear understanding of the availability of specialized legal forms and how frequently these materials are used in instruction.

1. The results revealed significant gaps in the availability of critical instructional materials, such as the Affidavit of Arresting Officer, Affidavit of Witness, and Application/Petition to Wire Tapping. The insufficient provision of these essential resources limits students' exposure to authentic legal documents, which are vital for developing competence in technical writing, legal documentation, and professional communication.

2. Many instructional forms are underutilized in the teaching process. Even when resources are available, they are not consistently integrated into classroom activities, indicating a disconnect between materials and practical application. This underutilization may hinder students' acquisition of essential skills required for future roles in law enforcement and legal contexts.

3. The combined findings showed the need for alignment between the curriculum and the practical demands of Criminology education. Essential legal forms and documentation practices are not sufficiently emphasized, which may compromise students' readiness to perform real-world tasks in law enforcement agencies. Resolving these gaps is critical to preparing graduates who are capable of producing accurate, clear, and legally compliant documentation.

4. While the study focused on Capiz, the challenges observed, insufficient availability and limited utilization of instructional materials, may also be present in other provincial higher education institutions offering Criminology programs. Recognizing this potential broader relevance underscores the need for systemic interventions in both instructional material development and faculty capacity building across the Philippines.

RECOMMENDATIONS

Based on the findings regarding the sufficiency and utilization of instructional materials in Technical English 2, several recommendations are proposed to improve teaching and learning outcomes for Criminology students in Capiz and potentially in other provincial higher education institutions.

1. Higher education institutions should prioritize the creation and continuous updating of instructional materials, particularly for specialized legal forms such as the Affidavit of Arresting Officer, Affidavit of Witness, and Application/Petition to Wire Tapping. Materials should be developed in collaboration with law enforcement agencies to ensure authenticity and alignment with current Philippine police and legal practices. Following CHED Memorandum Order No. 46, series of 2019, these materials must address all program outcomes for Criminology, especially technical writing, legal documentation, and professional competencies. Utilizing up-to-date formats of police reports, affidavits, petitions, and other documents will allow students to practice with real-world resources, enhancing their readiness for professional responsibilities.

2. To address the underutilization of instructional materials, institutions should implement targeted professional development initiatives. Workshops, training sessions, and mentoring programs can equip instructors with practical strategies for integrating a diverse range of instructional forms into classroom instruction. Faculty development will improve the frequency and quality of material utilization, fostering active learning and strengthening students' technical writing and legal documentation skills. Other provincial colleges and universities may benefit from similar programs to ensure consistency in teaching practices nationwide.
3. Institutions should establish mechanisms to periodically evaluate the curriculum and instructional resources. Assessing both the sufficiency and practical use of materials ensures that teaching resources remain relevant, sufficient, and responsive to the evolving demands of criminology education. Regular reviews also allow the curriculum to adapt to changes in legal procedures and law enforcement requirements, bridging gaps between student learning and professional expectations.
4. While this study focused on Capiz, the findings may reflect similar challenges in other provincial higher education institutions. Further studies are encouraged to examine instructional material sufficiency and utilization across the Philippines. Additionally, research assessing the impact of newly developed or updated instructional materials on student performance can provide evidence-based insights to guide continuous improvement in instructional design, curriculum development, and professional readiness of Criminology graduate.

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A PREDICTIVE MODEL OF THE IMPACT OF TECHNOLOGICAL ADVANCEMENTS AND INNOVATION ON LEADERSHIP AND MANAGEMENT PRACTICES IN THE STEEL MANUFACTURING INDUSTRY IN THE DIGITAL AGE

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ABSTRACT

This study developed a predictive management model that examines how technological advancements influence leadership practices and organizational management in the steel manufacturing industry. Specifically, it investigated how adaptability to Artificial Intelligence (AI), Robotics, the Internet of Things (IoT), and Big Data Analytics shapes leadership effectiveness and contributes to organizational performance in the digital age. A mixed-method research design was used. Quantitative data were collected through surveys from 80 professionals across different steel manufacturing firms, while qualitative insights were obtained through expert interviews and thematic analysis. Descriptive statistics, correlation, and linear regression were used for quantitative analysis, while NVivo supported qualitative coding. Results show that all four technological domains exhibit moderate adaptability, with Robotics receiving the highest mean score (3.93), followed by Big Data (3.91), IoT (3.90), and AI (3.85). Leadership and management practices were also rated moderately (M = 3.88), with innovation leadership and accountability-focused leadership receiving the strongest ratings. Significant positive correlations emerged between leadership practices and adaptability to Robotics (r = .82), IoT (r = .75), and Big Data (r = .75). AI's correlation was weaker but statistically significant (r = .28). The regression model demonstrated a strong predictive fit (R² = .86), identifying Robotics and Big Data adaptability as the strongest predictors of effective leadership practices. Challenges identified include financial constraints, training gaps, resistance to change, and difficulty adapting to new technologies. Findings suggest that technological adaptability, particularly in robotics and big data analytics, greatly enhances leadership and management effectiveness within the steel manufacturing industry. The proposed predictive model offers actionable guidance for industry leaders, emphasizing strategic investment, targeted training, and effective change management as essential components of digital transformation.

Keywords: Artificial Intelligence, Robotics, Internet of Things, Big Data Analytics, Technological Advancement, Digital Leadership

INTRODUCTION

The rapid rise of digital technologies has significantly reshaped leadership and management practices across various industries. Innovations such as artificial intelligence (AI), robotics, blockchain, and big data analytics are no longer just tools for efficiency—they are redefining how organizations make decisions, manage their workforce, and streamline operations. As a result, leaders are now challenged to adopt approaches that are not only technologically informed but also flexible and innovative enough to keep pace with today's fast-evolving business landscape (Kane et al., 2019; Northouse, 2021).

In this digital era, traditional top-down leadership structures are proving less effective. Organizations are moving toward more collaborative, agile, and data-driven cultures that encourage experimentation

and continuous learning (Westerman, Bonnet, & McAfee, 2014). This shift also highlights the growing need for leaders who can balance technical proficiency with emotional intelligence. While technology drives efficiency, it is the human element—empathy, communication, and ethical decision-making—that ensures these tools truly support organizational and employee well-being (Goleman, 2020).

Additionally, the expansion of remote work and virtual collaboration platforms has changed how leaders connect with their teams. Today's leaders must not only manage digital workflows but also cultivate engagement, inclusivity, and trust in increasingly decentralized and diverse work environments (Deloitte, 2021; Gable, 2021). In essence, leadership in the digital age requires a harmonious blend of technological savvy and human-centered management to steer organizations toward sustainable success.

Statement of the Problem

Many steel manufacturing companies, both public and private, face difficulties integrating new technologies into traditional management systems. Existing leadership models are often rigid and hierarchical, making it hard to encourage innovation and adaptability. This results in slower decision-making, resistance to change, and an inability to take full advantage of digital transformation. Thus, this study aims to develop a quantitative management model that explains how technological advancements influence leadership practices and organizational management in the steel industry.

Specifically, the study seeks to answer the following questions:
1. What is the demographic profile of the respondents in terms of:
    1.1. Gender
    1.2. Age
    1.3. Educational qualification
    1.4. Years of experience in the steel industry
    1.5. Current position
    1.6. Department
    1.7. Company size
2. How do respondents assess technological advancement in the steel industry in terms of:
    2.1. Artificial intelligence
    2.2. Robotics
    2.3. Internet of Things
    2.4. Big data analytics
3. How do respondents assess leadership and management practices in the steel industry?
4. Is there a significant relationship between technological advancement and leadership practices?
5. What challenges do leaders face in integrating technology into management practices?
6. What predictive model can be developed to address these challenges in the digital age?

LITERATURE REVIEW

Technological Management

Technological management involves the strategic use of technology to improve efficiency, productivity, and competitiveness. Hitt (2021) emphasized that modern management research must address the complexities of globalization, innovation, and digital transformation. He noted that integrating technology into strategic planning strengthens an organization's adaptability to disruption. Similarly, Gupta (2017) discussed how managing technology and innovation strategically allows firms to gain a competitive advantage in global markets. Both studies highlight that effective technological management bridges innovation and strategy to sustain long-term growth.

Innovation Management

Innovation management is essential for maintaining competitiveness in rapidly changing environments. Tidd and Bessant (2018) explained that organizations must foster a culture of innovation that encourages experimentation and risk-taking. Chen et al. (2019) emphasized aligning innovation efforts with strategic goals, leadership, and resources. Likewise, Teece (2019) proposed a dynamic capabilities framework to understand how firms manage open innovation effectively. Together, these studies suggest

that successful innovation requires strategic planning, a supportive culture, and continuous capability development.

Change Management in Technology Adoption

Adopting new technologies often presents challenges for organizations. Choi (2018) identified workforce readiness and training as key factors for successful adoption. Merovitz et al. (2024) discussed the rise of Digital Adoption Platforms (DAPs), which help users navigate complex systems and support digital transformation. These tools provide contextual assistance, analytics, and engagement monitoring. However, challenges such as cost and integration complexity remain. Effective change management therefore requires both human resource development and supportive digital infrastructure.

Strategic Technology Management

Strategic Technology Management (STM) focuses on aligning technological advancements with organizational strategy. Teece (2018) highlighted the importance of technology forecasting to anticipate industry trends and disruptions. Continuous environmental scanning allows organizations to prepare for and adapt to technological shifts, ensuring sustainability and competitiveness.

Project Management for Technological Initiatives

Effective project management ensures that technology-driven initiatives are executed efficiently. The Project Management Institute (PMI, 2017) emphasized structured methodologies and best practices for planning, execution, and evaluation. These frameworks help minimize risks, maintain timelines, and achieve project goals, which are essential in technology-intensive projects.

Measuring Technology's Impact on Performance

Brynjolfsson and Hitt (2000) demonstrated that investments in information technology can lead to significant productivity gains. They recommended developing metrics to assess the value of technological initiatives accurately. Measurement and evaluation help organizations understand whether technological innovation translates into real performance improvements.

Advanced Management Technologies

Brynjolfsson and McAfee (2017) discussed how artificial intelligence (AI), big data, and automation transform management practices by enabling real-time analytics and predictive modeling. Big data analytics also enhances decision-making and operational efficiency (Wamba et al., 2017). Marler and Boudreau (2017) added that big data supports talent acquisition and retention through predictive insights. Overall, advanced management technologies improve both managerial decisions and business outcomes.

Automation and Process Management

Automation enhances efficiency by reducing human error and accelerating task execution. Huang and Rust (2018) noted that managers must balance automation with human oversight to maintain service quality. Dhanraj et al. (2023) identified reduced errors, cost savings, and faster processes as benefits of automation, while also emphasizing the need to upskill workers for new technological environments.

Collaborative Technologies and Strategic Alignment

Porter and Heppelmann (2020) argued that aligning technology strategy with business objectives ensures that investments deliver measurable value. Cloud computing, IoT, and data analytics must support broader business goals to maximize benefits. Luftman (2000) similarly emphasized the necessity of aligning IT and business strategies to promote collaboration and optimize performance.

Leadership and Digital Transformation

Leadership plays a crucial role in guiding organizations through technological change. Kane et al. (2015) found that leaders with collaborative and adaptive styles are better equipped to manage digital transformation. Fitzgerald et al. (2017) noted that leadership support and organizational culture greatly influence employee adaptation to new technologies. Studies by Sull and Sull (2020) and Wang and Hu (2019) showed that data-driven and participative leadership enhances innovation and responsiveness in the digital era.

Challenges in Digital Transformation

Westerman et al. (2017) identified common barriers to digital transformation, including resistance to change, insufficient leadership, and lack of digital skills. Kotter (1996) highlighted the importance of creating urgency, building coalitions, and reinforcing change to overcome resistance. Effective leadership thus combines technological expertise with emotional intelligence.

Technological Innovation and Competitive Advantage

Porter and Heppelmann (2014) concluded that companies leveraging technology to create differentiated products achieve sustained competitive advantage. Wanaswa et al. (2023) and Ryde et al. (2024) further found that technological innovation, when supported by strategic leadership and analytics, strengthens competitiveness and resilience.

Future Trends and the Fourth Industrial Revolution

Schwab (2016) emphasized that the Fourth Industrial Revolution—driven by AI, IoT, and automation—requires organizations to continuously innovate. Companies that integrate emerging technologies effectively are more adaptable and better positioned for long-term success. As noted by Westerman et al. (2021), digital transformation enhances strategic decision-making and customer engagement through data-driven insights.

Synthesis

The reviewed literature highlights that technological management integrates innovation, leadership, and change management to sustain organizational performance. Hitt (2021) and Gupta (2017) stressed the strategic role of technology in achieving competitive advantage, while Tidd and Bessant (2018) and Teece (2019) underscored innovation as a continuous process supported by dynamic capabilities. Effective change management, as discussed by Choi (2018) and Merovitz et al. (2024), ensures workforce readiness and system adoption. Leadership studies (Kane et al., 2015; Sull & Sull, 2020) reveal that adaptability and collaboration are essential for guiding digital transformation. Strategic alignment between technology and business goals (Luftman, 2000; Porter & Heppelmann, 2020) further enhances innovation outcomes. Ultimately, successful technological management requires a holistic approach that integrates strategy, innovation, leadership, and digital capability to sustain competitiveness in the modern industrial landscape.

METHODOLOGY

This study employs a mixed-method research design, integrating both qualitative and quantitative approaches to achieve a comprehensive understanding of the impact of technological advancements on innovative leadership and management practices.

The quantitative aspect focuses on analyzing measurable data related to technological adoption, leadership adaptability, and organizational outcomes. The qualitative aspect explores deeper insights into challenges and perspectives through interviews and focus group discussions.

This design allows for data triangulation, thereby enhancing the validity and reliability of the findings (Creswell & Plano Clark, 2018).

Data for the study were gathered through surveys, interviews, and document analysis to ensure a comprehensive understanding of digital leadership and technological integration within the steel manufacturing industry. The survey generated quantitative data describing respondents' demographic profiles, leadership practices, and organizational outcomes. Meanwhile, interviews offered deeper qualitative insights into the challenges, experiences, and perceptions associated with adopting advanced technologies. To further contextualize these findings, company documents—including strategic plans, performance reports, and technology investment records—were reviewed.

Throughout the data collection process, ethical standards were strictly upheld. Participants were informed of the study's purpose, assured of voluntary participation, and guaranteed confidentiality, consistent with established ethical guidelines. Prior to distribution, the survey instrument underwent expert validation to ensure clarity, relevance, and reliability. Data collection was conducted both onsite and online to reach participants across different company locations. Once gathered, quantitative responses

were encoded for statistical analysis, while qualitative data were examined through thematic analysis to identify recurring patterns and meaningful insights.

The primary tool used in the study was a structured questionnaire developed by the researcher. The instrument consisted of sections covering respondents' demographic and professional profiles, leadership and management practices related to digital transformation, and the organization's adaptability to technological advancements such as artificial intelligence, robotics, the Internet of Things, and big data analytics. Perceptions were measured using a five-point Likert scale, which classified technological adaptability into high, moderate, and low levels based on corresponding mean ranges. Open-ended questions were also included to capture nuanced experiences and perceived challenges in technology implementation. The questionnaire was reviewed by three experts to strengthen content validity and ensure that items were clear and aligned with the study's objectives.

For data analysis, descriptive statistics such as frequency distribution, mean, and standard deviation were used to summarize quantitative findings, while correlation analysis helped determine relationships among variables. Thematic analysis of qualitative data followed Zhang's (2019) six-phase framework, which involved familiarizing with the data, generating initial codes, identifying and reviewing themes, defining theme categories, and producing the final narrative.

Document analysis served as an additional source of evidence, offering insights into the organization's technological priorities, investment strategies, and existing challenges such as training deficits, financial constraints, and infrastructure limitations. By comparing interview and survey responses with official company documents, the study achieved data triangulation, which strengthened the credibility and depth of the findings. And from surveys, interviews, and documents were compared to strengthen the overall validity and confirm consistency among data sources.

RESULT AND DISCUSSION

The results of the study offer a comprehensive perspective on how technological advancements are shaping leadership adaptability and innovation within the steel manufacturing industry. While the statistical findings present measurable perceptions, the responses also reflect the lived experiences of a workforce and leadership community that are gradually transitioning from traditional operations toward digitally enhanced systems. The discussion below integrates both quantitative outcomes and contextual interpretation to present a more holistic understanding of the industry's digital transformation.

The demographic profile reveals that the industry is predominantly male and composed largely of mid-career professionals with substantial work experience. A significant portion of respondents fall within the 30–49 age range, and many possess more than a decade of service in steel manufacturing. This indicates that the participants have witnessed and adapted to multiple operational changes over time. The high percentage of bachelor's degree holders further suggests that the workforce is academically prepared to engage with new technological processes. Employees with long industry tenure bring extensive familiarity with legacy systems, which may influence their openness to, or cautious approach toward, digital tools. Their perspectives therefore provide credible insights into the practical implications of technology integration in everyday operations.

Table 3. Demographic Profile of Respondent

Frequency and Percentage Profile Distribution of the Respondents

Gender	Counts	% of Total	Cumulative %
Female	10	13 %	13 %
Male	70	88 %	100 %
Age Group	Counts	% of Total	Cumulative %
21-29	14	18 %	18 %
30-39	28	35 %	53 %
40-49	22	28 %	80 %
50-59	16	20 %	100 %
Highest Educational Qualification	Counts	% of Total	Cumulative %
Bachelor Degree	63	79 %	79 %
Doctoral Degree	3	4 %	83 %
High School	3	4 %	86 %
Other please specify	11	14 %	100 %

Years of Experience in the Steel Manufacturing Industry:	Counts	% of Total	Cumulative %
11-15 years	29	36 %	36 %
16-20 years	10	13 %	49 %
21-25 years	6	8 %	56 %
26-30 years	6	8 %	64 %
5- 10 years	15	19 %	83 %
Less than 5 years	14	18 %	100 %
Current Job Position	**Counts**	**% of Total**	**Cumulative %**
Director	2	3 %	3 %
Engineer/Technical Specialist	31	39 %	41 %
Manager	14	18 %	59 %
Other (please specify) _____	22	28 %	86 %
Supervisor/Team Lead	11	14 %	100 %
Department:	**Counts**	**% of Total**	**Cumulative %**
Human Resources,	2	3 %	3 %
T/Technology	9	11 %	14 %
Other (please specify) _____	31	39 %	53 %
Production	28	35 %	88 %
Quality Control	6	8 %	95 %
Quality Control,	2	3 %	98 %
Research & Development,	2	3 %	100 %
Company Size	**Counts**	**% of Total**	**Cumulative %**
Large (500 or more employees)	61	76 %	76 %
Medium (100-499 employees)	11	14 %	90 %
Small (Less than 100 employees)	8	10 %	100 %

The demographic summary indicates that the steel industry workforce is overwhelmingly male, technically skilled, and mid-career, operating mainly in large production-focused companies. The educational profile reveals that 79% hold a bachelor's degree, showing a high level of formal education among participants. Most respondents have 11–15 years of experience (36%), emphasizing their familiarity with technological and operational advancements

Perceptions of Technological Advancements
Across the four major technologies—AI, Robotics, IoT, and Big Data Analytics—respondents generally expressed moderate to high levels of agreement regarding their benefits. These technologies were not only perceived as tools for operational enhancement but also as catalysts for improving safety, decision-making, and overall productivity.

Artificial Intelligence (AI)
AI received moderate ratings, with respondents recognizing its usefulness in predictive maintenance, operational efficiency, and decision-making accuracy. However, the overall moderate adaptability score suggests that while AI is viewed positively, full integration has yet to be achieved. This may indicate ongoing challenges related to skills development, system familiarity, or organizational readiness.

Table 4. Perceived Technological Advancement Along AI

AI Indicators	Mean	SD	Verbal Interpretation
AI improves decision-making accuracy and speed.	3.81	0.89	Moderate
AI enhances predictive maintenance and operational efficiency.	3.94	0.85	Moderate
AI-driven automation reduces repetitive tasks for leaders.	3.88	0.80	Moderate

Overall, respondents acknowledged AI's potential but indicated moderate adaptability (M = 3.85), suggesting ongoing challenges in full integration due to skill or cultural barriers.

Robotics
Robotics emerged as the most highly accepted technology, with respondents strongly agreeing that robotic systems enhance production efficiency, improve safety, and foster innovation. This high level of acceptance reflects the practical and visible impact of robotics on daily operations. Employees' direct experience with improved safety conditions and reduced manual strain may explain their stronger confidence in robotics compared with other technologies.

Table 5. Perceived Technological Advancement Along Robotics

Robotics Indicators	Mean	SD	Verbal Interpretation
Robotics enhances production efficiency and quality.	4.01	1.07	High
Robotics minimizes workplace accidents and improves safety.	4.16	0.96	High
Robotics fosters innovation in manufacturing processes.	4.03	0.91	High

Although overall adaptability was moderate (M = 3.93), robotics showed the highest acceptance among all technologies, suggesting greater readiness in this area.

Internet of Things (IoT)

Perceptions of IoT were similarly favorable, particularly in enhancing operational transparency and enabling predictive maintenance. Nonetheless, some indicators were rated only moderately, suggesting partial implementation or a gradual shift toward fully utilizing interconnected systems. This reflects a transitional phase in which IoT adoption is underway but not yet maximized.

Table 6. Perceived Technological Advancement Along Internet of Things (IoT)

IoT Indicators	Mean	SD	Verbal Interpretation
IoT allows predictive maintenance and asset tracking.	4.04	0.86	High
IoT enhances operational transparency.	4.06	0.93	High
IoT fosters digital transformation in industrial management.	3.95	0.91	Moderate

Overall adaptability for IoT (M = 3.90) reflects steady integration but room for improvement in data utilization and leadership responsiveness.

Big Data Analytics

Big Data Analytics also received moderate ratings across all indicators. Respondents acknowledged its potential for competitive benchmarking, innovation, and productivity improvement. The consistency of these ratings implies that while the value of data-driven insights is understood, organizations may still be developing the capacity and infrastructure needed to fully apply data analytics in strategic and operational decision-making.

Collectively, these findings depict an industry that is steadily progressing toward technological maturity. The workforce demonstrates awareness of the benefits these technologies bring, though full integration remains a work in progress.

Table 7. Perceived Technological Advancement Along Big Data Analytics

Big Data Indicators	Mean	SD	Verbal Interpretation
Big Data aids competitive benchmarking.	3.97	0.96	Moderate
Big Data identifies innovation opportunities.	3.97	0.92	Moderate
Big Data enhances workplace productivity.	3.97	0.92	Moderate

The overall mean (M = 3.91) shows that data-driven decision-making is increasingly recognized, though full adoption remains in progress.

Overall Impact of Technological Advancements
Leadership and Management Practices in the Digital Era

The adoption of leadership and management practices aligned with digital transformation was rated as moderate overall. This suggests that while leaders are beginning to shift toward more adaptive and innovation-oriented approaches, traditional methods remain influential.

Several leadership dimensions received higher ratings, including learning-oriented leadership and accountability-focused leadership. These findings indicate that leaders are becoming more receptive to continuous learning and evidence-based performance management—key attributes for navigating digital change.

However, the moderate ratings for areas such as data-informed decision-making, responsive leadership, and digital communication indicate that leaders are still developing proficiency in integrating digital tools into their managerial practices. This reflects a common transitional challenge in industries undergoing technological advancement: leaders must acquire new competencies, adopt new mindsets, and align their decision-making processes with emerging technological capabilities.

The variability in leadership practice ratings highlights the evolving nature of leadership roles in digitally transforming environments. Leaders are increasingly expected to balance traditional expertise with digital literacy, strategic foresight, and collaborative innovation.

Table 9. Perceived Adoption of Leadership Management Practices
Aligned with Digital Leadership Models

Practices	Mean	SD	Verbal Interpretation
Data-informed decision-making – Leaders rely on AI insights for rapid and evidence-based choices.	3.81	0.89	Moderate
• Operational oversight – Leaders use AI to proactively manage resources and reduce downtime.	3.94	0.85	Moderate
Delegation through technology – Shifting routine tasks to AI, allowing leaders to focus on strategy.	3.88	0.8	Moderate
Strategic human resource planning – Using AI insights to align talent with organizational goals	3.83	0.91	Moderate
• Continuous learning mindset – Adapting quickly based on real-time feedback loops.	3.85	1.04	Moderate
Learning-oriented leadership – Encouraging continuous learning and adaptability.	4.03	0.91	High
Safety-first leadership – Prioritizing employee well-being in tech implementations.	3.83	1.06	Moderate
Innovation leadership – Driving R&D efforts and encouraging experimental approaches.	3.91	0.98	Moderate
Change facilitation – Helping teams adjust to collaborative robotics (cobots).	3.9	0.98	Moderate
Cost-conscious decision-making – Balancing automation investment with ROI.	3.99	0.91	Moderate
Responsive leadership – Making immediate, informed decisions based on live data.	3.8	0.86	Moderate
Asset management leadership – Overseeing the lifecycle of equipment with predictive insights.	3.98	0.84	Moderate
Accountability-focused leadership – Using data to validate performance and outcomes.	4	0.89	High
Supply chain leadership – Optimizing flow, inventory, and logistics through smart technologies.	3.92	0.87	Moderate
Digital communication leadership – Leveraging connected platforms for clear, consistent messaging.	3.88	0.83	Moderate
Experience design leadership – Using insights to refine and tailor the customer journey.	3.6	0.98	Moderate
Data culture advocacy – Promoting fact-based thinking across the organization.	3.79	0.98	Moderate
Feedback-oriented leadership – Using performance data to guide coaching and development	3.75	1	Moderate
Innovation-forward leadership – Championing advanced tech to improve competitiveness	3.73	0.91	Moderate
Innovation leadership – Spotting unmet needs or emerging trends through data patterns.	4.17	3.4	High
Overall Adoption of Leadership Practices	**3.88**	**0.73**	**Moderate**

Overall, the results illustrate an industry in the midst of digital transition. Employees acknowledge the advantages of advanced technologies, and leaders are gradually aligning their practices with the demands of a digital workforce. However, the consistent pattern of moderate adaptability across technological and leadership indicators suggests that the transformation is ongoing rather than fully established.

Technology adoption is recognized as beneficial, yet its success depends not only on system implementation but also on workforce readiness, leadership support, and organizational culture. The findings emphasize that digital transformation in the steel manufacturing industry is both a technological and human endeavor—one that requires sustained effort, continuous training, and adaptive leadership.

CONCLUSIONS

Based on the data collected, the study investigated the influence of technological advancements—specifically artificial intelligence (AI), robotics, the Internet of Things (IoT), and big data analytics—on leadership practices and organizational management within the steel manufacturing industry. The study also explored the challenges encountered during technological integration and the mediating role of leadership practices. Furthermore, it examined the relationship between technological advancements and innovative leadership models to provide a robust framework that equips leaders to address the challenges of the digital age effectively. The study is expected to contribute significantly to academic literature by providing an industry-specific leadership framework that bridges theory and practice. Robotics received

the highest mean score (3.93), reflecting strong appreciation for its role in enhancing safety and productivity. Big data (3.91) and IoT (3.90) also demonstrated moderately high adaptability, particularly in operational transparency and data-driven decision-making. AI, though recognized for its benefits in predictive maintenance and automation, received a slightly lower adaptability score (3.85), indicating some reservations or barriers in full-scale implementation.

The adoption of leadership and management practices showed the overall extent of digital leadership practices in the steel manufacturing industry was found to be moderate, with a mean of 3.88. High ratings were given to practices such as innovation leadership (4.17), learning-oriented leadership (4.03), and accountability-focused leadership (4.00), indicating that respondents value adaptability, continuous learning, and data-backed performance evaluation. However, other practices such as experience design leadership and feedback-oriented leadership received relatively lower scores, revealing gaps in customer-centric strategy and performance coaching using analytics. These findings suggest that while digital leadership is gaining traction, it remains uneven across specific competencies.

In terms of relationship between technological adaptability and leadership practices established a statistically significant positive correlations between all four technological areas and leadership practices, with the strongest relationships found in robotics adaptability ($r = 0.82$, $p < .001$), big data and IoT (both $r = 0.75$, $p < .001$). AI showed a weaker, yet still significant, correlation ($r = 0.28$, $p = .011$). This suggests that greater adaptability to robotics, IoT, and big data is strongly associated with enhanced leadership and management effectiveness, while AI's weaker correlation may reflect practical implementation challenges. Interviews revealed four major challenges in integrating technology into leadership practices: (T1) budget and cost-related constraints, (T2) training and knowledge gaps, (T3) organizational resistance to change, and (T4) difficulty in adapting to technological changes.

The high costs and delayed approvals hinder investment, while limited training and support prevent employees from effectively using advanced tools. Moreover, fear of change and unclear guidance on how to apply technology in daily operations hamper successful integration. To sustain change management efforts, the development of a predictive model successfully developed a linear regression model that predicts the impact of technological adaptability on leadership and management practices. The model demonstrated a high level of fit ($R = 0.93$, $R^2 = 0.86$), indicating that 86% of the variance in leadership practices can be explained by adaptability to AI, robotics, IoT, and big data. Robotics ($\beta = 0.45$, $p < .001$) and big data ($\beta = 0.33$, $p < .001$) emerged as the most significant predictors, whereas AI ($\beta = -0.15$, $p = .064$) and IoT ($\beta = 0.11$, $p = .294$) were not statistically significant. This highlights robotics and big data as strategic technological drivers for advancing leadership in the steel manufacturing sector, while AI and IoT require further strategic attention and support for effective leadership impact. (part of the results) To conclude, the results of the study, showcases that the steel manufacturing industry workforce is predominantly composed of experienced, technically skilled, mid-career male professionals primarily engaged in production and technical roles within large-scale organizations. This demographic profile provides a solid foundation for effective technological integration, though it also highlights a notable gender imbalance that could affect organizational dynamics and inclusive. Industry leaders moderately recognize and are progressively adapting to various technological advancements, particularly robotics and big data analytics. Robotics, due to its immediate operational benefits such as safety enhancements, efficiency gains, and improved product quality, demonstrates the strongest adoption and integration among technologies evaluated.

Overall, the regression model clearly identifies robotics and big data as key technological drivers positively influencing leadership and management practices. Conversely, the ambiguous or weaker roles of AI and IoT suggest areas where additional support, training, or organizational adjustments may be necessary. Therefore, industry leaders should strategically prioritize investments in robotics and big data analytics, while also addressing implementation challenges related to AI and IoT to fully harness technological advancements in enhancing their leadership effectiveness and organizational performance.

Mathematically, the model can be expressed as follows:

EFFECTIVE LEADERSHIP AND MANAGEMENT PRACTICES

$$= 0.92 - 0.15 \text{ AI ADAPTABILITY} + \text{ROBOTICS ADAPTABILITY}$$
$$+ 0.33 \text{ BIG DATA ADAPTABILITY} + 0.11 \text{ IoT ADAPTABILITY}$$

RECOMMENDATIONS

The study show that digital leadership within the steel manufacturing industry is progressing, yet it has not fully reached the level of maturity required for highly dynamic technological environments. While many leaders are beginning to adopt innovation-driven and learning-oriented approaches, notable gaps remain in areas such as strategic human resource management, timely decision-making, and the development of broader organizational innovation capabilities. The results further reveal a strong and meaningful relationship between technological adaptability—particularly in robotics and big data analytics—and the overall effectiveness of leadership and management practices. These technologies appear to play a central role in shaping more responsive, data-informed, and forward-looking leadership behaviors.

Despite these advancements, organizations continue to face several challenges in implementing digital technologies. Budget limitations, inadequate employee training, resistance to change, and difficulties in adapting technologies to actual work conditions emerged as the most persistent barriers. Addressing these issues calls for a holistic and well-structured strategy that includes careful financial planning, sustained training programs, strong leadership commitment, and clear communication of implementation plans. The study's predictive model reinforces this by identifying robotics and big data analytics as key technological drivers that significantly enhance leadership and management outcomes. In comparison, AI and IoT adaptability showed less influence, suggesting the need for more focused initiatives and strategic interventions to maximize their potential contributions.

Given these insights, investing in leadership development becomes essential. Organizations should prioritize capacity-building programs that strengthen leaders' digital literacy, innovation management, and ability to navigate change. Considering the substantial costs of technological upgrades, exploring phased implementation strategies and accessible funding mechanisms would help ensure smoother transitions. Equally important is the provision of comprehensive training for employees at all organizational levels to address the evolving knowledge and skill requirements brought about by advanced technologies. Creating a work culture that values continuous learning, openness to change, and collaborative innovation can further reduce resistance and support sustained digital transformation.

For future research, the study recommends examining the long-term impact of digital leadership on organizational sustainability and resilience. Longitudinal studies would provide deeper insights into how leadership behaviors and technological capabilities interact over time and how they contribute to the industry's ability to remain competitive in rapidly changing environments.

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READING PERFORMANCE OF GRADE II PUPILS AT YABBI ELEMENTARY SCHOOL: BASIS FOR DEVELOPMENT OF INSTRUCTIONAL TECHNOLOGY RESOURCES USING MARUNGKO APPROACH

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ABSTRACT

This study was conducted to measure the reading performance of Grade II pupils at Yabbi Elementary School as basis for development of instructional technology resources using Marungko Approach. The researcher employed quantitative research design. In order to achieve the objectives of the study, the Early Grade Reading Assessment (EGRA) tool was used to assess the reading performance of the twenty-two Grade 2 pupils enrolled for the School Year 2024-2025. The study used total enumeration as the sampling procedure since all the Grade 2 pupils were considered as the respondents of the study. Mean was used in the study. It was found that the reading performance of the respondents in terms of orientation to print is described as observed (Mean=2.23); letter name knowledge is identified as very low mastery (Mean=16.91); letter sound knowledge is very low mastery (Mean=14.14); initial sound identification is classified as mastered (Mean=8.23); familiar word reading is rated as low mastery (Mean=23.64); invented word decoding is recorded as low mastery (Mean=17.77); oral passage reading is evaluated as low mastery (Mean=24.59); reading comprehension is assessed as very low mastery (Mean=1.00); listening comprehension is marked as low mastery (Mean=2.95); and dictation is labeled as moving toward mastery (Mean=4.05). The findings led to the development of instructional technology resources, specifically video lessons and a digitized big book, aimed at enhancing pupils' reading abilities.

Keywords: instructional technology resources, Marungko Approach, reading performance

INTRODUCTION

Reading is a fundamental skill that serves as the foundation for all learning. Learning to read is a crucial skill for pupils to acquire. This human cognitive ability is essential to existence and modern society (Santos & De Vera, 2020). Reading is also a gateway to new worlds and to opening one's mind (Pagcaliwagan, 2019). Active reading and the desire to read can lead a student to find pleasure in reading, even though reading is a laborious process that decodes meaning from prints (Laurente, 2021) and requires experience and effort (Wolf, 2008).

While reading is one of the most fundamental components of learning, 250 million primary school-aged children in most developing nations found reading very challenging (Santos & De Vera, 2020). It is a fact that over half of the students in grade two are illiterate and over 30% of students in grade three were zero word readers (Education for All, 2014).

This is particularly the case in the Philippines. In the 2019 Program for International Student Assessment (PISA) results, the Filipino students at age 15 attained 340 points in reading literacy, which is far below the average of 487 points. Consequently, among the 79 nations, the Philippines ranked lowest (Ramos & Boltron, 2021). Among the issues afflicting the Philippine education system are the high levels of Filipino poor readers, which are closely associated with low levels of attainment, especially for the public schools. According to the Southeast Asia Primary Learning Metric (Bernardo et al., 2022) ex-

plained in Alauya and Basmayor (2023), some of the Filipino fifth graders' achievement in 2019 illustrated the weakest ability in three areas: reading, writing, and mathematics.

To address the issue on reading, Memorandum No. 173, Series of 2019 entitled "Hamon: Bawat Bata Bumabasa (A 3B's initiative)" was released by the Department of Education. It articulates the unremitting effort to fulfill its mandate of producing law-abiding and productive citizens who possess the basic knowledge and skills necessary for life-long learning. It is the duty of every school nationwide to assist learners in acquiring mastery of their reading abilities so that every student can become a good reader (DepEd, 2019). In addition, literacy development during preschool years is an advocacy of the Philippine education system. The department has also used assessments to measure the reading skills of the pupils. One of these is the Early Grade Reading Assessment (EGRA) pretests which are used by the primary schools to identify the reading performance and deficiencies of the pupils every school year. This is a part of the interventional step to lower the proportion of pupils who are illiterate in alphabetic letter and sound recognition. For instance, the Marungko Approach was found to have a significant positive impact on students' reading development in terms of phonetics, word recognition, fluency, comprehension, and vocabulary (Dimacial & Lumapenet, 2023). This strategy may aid in lowering the percentage of non-readers.

The development of instructional technology resources using Marungko Approach was anchored on the Sustainable Development Goals (SDGs), particulary SDG 4: Quality Education. SDG 4 aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." By developing contextualized instructional materials, the study addresses the need for culturally relevant and contextually meaningful education for indigenous learners, which is a core aspect of inclusive and equitable education. This study was anchored on the National Research Agenda for Teacher Education (NRATE) by aligning with its goals to enhance teaching strategies and learning materials that address learner needs and improve educational outcomes. Specifically, this study supports NRATE's emphasis on developing contextually relevant and culturally responsive instructional materials that improve reading performance of pupils by integrating indigenous knowledge and local contexts into the curriculum. The study was also anchored to the research agenda of the DepEd particularly under the thematic area of Teaching and Learning, which emphasizes improving learning outcomes through innovative, evidence-based, and context-relevant strategies. Specifically, the research contributes to Literacy and Numeracy addressing the persistent challenges in reading and writing competencies among learners, especially in early grade levels.

Statement of the Problem

The primary goal of this study was to measure the reading performance of Grade II pupils at Yabbi Elementary School for the School Year 2024-2025 as basis in the development of instructional technology using Marungko approach.

Specifically, this study sought to answer the following research questions:
1. What is the reading performance of the respondents in terms of orientation to print, letter name knowledge, letter sound knowledge, initial sound identification, familiar word reading, invented word decoding, oral passage reading, reading comprehension, listening comprehension, and dictation?
2. Based on the reading performance level of the respondents, what instructional technology resources using Marungko Approach could be developed?

RESEARCH METHODOLOGY

Research Design

This study utilized quantitative research design. This research design was used in an effort to tackle the purposes indicated in this research.

This study specifically utilized the descriptive and developmental approaches, which in educational research aims to systematically describe a population's trait or phenomenon without intervening or manipulating any variable. In responding to questions like "who," "what," "where," and "how," this method provides a clear picture of the current status of subjects of study. In reading performance, it enables researchers to gather information on various factors affecting the reading abilities of students, such as de-

mographic information, teacher application of reading strategies, and student performance levels (Mara, 2024).

On the other hand, the development approach concentrates on designing and assessing educational programs intended to promote certain skills or abilities, for instance, reading. This approach entails systematic design and assessment of educational interventions to ascertain whether they meet stated requirements and are in accordance with stipulated standards. Based on descriptive research findings, the development approach might result in the formulation of individualized reading programs for Grade 2 students. For instance, if descriptive statistics show that many students are having trouble with phonics, a developmental approach can be used to develop targeted instructional materials that improve phonetic proficiency (Gaña, 2022).

Research Environment

The study was conducted at Yabbi Elementary School, one of the farthest schools located at Yabbi, Dupax del Norte, Nueva Vizcaya, since most of the Grade II pupils in this school demonstrated low reading performance. The school has undergone development, including the construction of various parks such as Science Park, Mathematics park, the play area of the Kindergarten, extension of the school head's office that serves as Home Economics room. Flooring of the multi-purpose hall has also been initiated and was made possible through the Children's Festival in October 2016. The school is also one of the pilot schools of the Resilient Education Information Infrastructure for the New Normal-REINN Project of DOST Advanced Science and Technology, benefitting from high-speed Starlink satellite internet access since September 8, 2023. Hence, learning makes more fun and enjoyable for the learners.

In the School Year 2022-2023, there were 15 learners (6 Grade 1 learners, 3 Grade 2 learners, and 6 Grade 3 learners) who underwent the National Learning Camp (Elementary Summer Reading Camp) based on the results of the Comprehensive Rapid Literacy Assessment (CRLA). The camp was scheduled on July 24 to August 25, 2023. In the following years, there were already no learners who underwent the National Learning Camp due to the dedicated efforts of the teachers during the regular school year. Through their commitment in providing quality education, offering remedial support, and addressing learning gaps early on, the need for additional summer interventions significantly decreased.

Respondents of the Study

Yabbi Elementary School pupils enrolled in Grade 2 for the School Year 2024–2025 were the chosen respondents of this research study. There were 22 Grade 2 pupils in the study, 11 males and 11 females. The respondents were chosen because most of them have emerging and developing level of reading performance based from the result of the Modified Comprehensive Rapid Literacy Assessment (mCRLA) when they were in Grade 1.

Research Instrument

To determine the reading ability of the Grade 2 students, the Early Grade Reading Assessment (EGRA) tool was used to obtain the key data that were aligned with the research inquiries. An assessment tool called the Early Grade Reading Assessment (EGRA) is used to assess reading ability of early grades, usually Grades 1 to 3. Its sole purpose is to assess the fundamental literacy capabilities for reading. The assessment is taken by an individual teacher or trained examiner, which provides a one-on-one assessment of every child's reading ability. For younger students who are perhaps not yet able to read on their own, this format is especially helpful.

Data Gathering Procedure

The researcher sought permission from the school head to conduct the study. Once approved, a letter of consent was also distributed to the respondents' parents. After securing all the necessary permits, the researcher administered the Early Grade Reading Assessment (EGRA) Philippine Version developed by USAID (2016). The instrument covered components such as orientation to print, letter name knowledge, letter sound knowledge, beginning sound identification, familiar word reading, invented word decoding, oral passage reading, reading comprehension, listening comprehension, and dictation. These components were used to measure the respondents' reading performance. The responses were recorded and tabulated for analysis. All data were treated with strict confidentiality and were used solely for the purpose of this research.

Statistical Treatment of Data
The data gathered from the respondents were analyzed using appropriate statistical tools to interpret and present the findings accurately.

Mean. This was used to determine the respondents' reading performance in terms of orientation to print, letter name knowledge, letter sound knowledge, initial sound identification, familiar word reading, invented word decoding, oral passage reading, reading comprehension, listening comprehension, and dictation.

Percentage. In this study, percentage was used to analyze and present categorical data specifically, the reading performance of respondents in terms of orientation to print, letter name knowledge, letter sound knowledge, initial sound identification, familiar word reading, invented word decoding, oral passage reading, reading comprehension, listening comprehension, and dictation. The goal was to determine how many respondents fall into each category based on their score ranges.

RESULTS AND DISCUSSION

Problem 1. What is the reading performance of the respondents in terms of orientation to print, letter name knowledge, letter sound knowledge, initial sound identification, familiar word reading, invented word decoding, oral passage reading, reading comprehension, listening comprehension, and dictation?

The reading performance of the respondents in terms of orientation to print, letter name knowledge, letter sound knowledge, initial sound identification, familiar word reading, invented word decoding, oral passage reading, reading comprehension, listening comprehension, and dictation are presented in table 1-9.

Table 1. Reading Performance of the Respondents in terms of Orientation to Print

Level	Score Range	Frequency	Percentage
Observed	2 and above	19	86.36
Not Observed	Below 2	3	13.64
Total		22	100.00
		Mean	**2.23**
		Level	**Observed**

As shown in table 1, 19 respondents (86.36%) obtained scores of 2 and above, which are described as observed in terms of orientation to print, while 3 respondents (13.64%) obtained scores below 2, described as *not observed*. Furthermore, the data reveal that the reading performance of the respondents in terms of orientation to print has a mean score of 2.23, corresponding to the level of *observed*. This indicates that most of the respondents demonstrated an observable orientation to print.

The findings of the present study imply that the Grade II pupils of Yabbi Elementary School possess observable reading performance in terms of orientation to print. On this measure, a substantial majority of participants (86.36%, n = 19) achieved a score of 2 or higher, categorized as observed, while a smaller percentage (13.64%, n = 3) achieved a score below 2, categorized as not observed. The mean score of 2.23 further supports the conclusion that, in general, respondents exhibited a clear orientation to print. This result aligns with current research emphasizing the significance of print orientation as a foundational reading skill. Smith and Johnson (2023) claim that children who demonstrate strong print orientation skills tend to develop better decoding and comprehension abilities in later grades.

Table 2. Reading Performance of the Respondents in terms of Letter Name Knowledge

Level	Score Range	Frequency	Percentage
Mastered	76-100	0	0.00
Moving Towards Mastery	51-75	1	4.54
Low Mastery	26-50	3	13.64
Very Low Mastery	0-25	18	81.82
Total		22	100.00
		Mean	**16.91**
		Level	**Very Low Mastery**

Table 2 shows that 18 respondents (81.82%) demonstrated *very low mastery* with scores ranging from 0–25, 3 respondents (13.64%) exhibited *low mastery* with scores between 26–50, and only 1 respondent (4.54%) was *moving towards mastery* with a score of 51–75. This indicates that the respondents' reading performance in terms of *letter name knowledge* has a mean score of 16.91, corresponding to a level of *very low mastery*.

The data suggest that the respondents' proficiency in recognizing letter names was generally poor. Specifically, only 4.54% (1 respondent) showed progress toward mastery, 13.64% (3 respondents) were in the low mastery category, and a substantial 81.82% (18 out of 22) fell within the very low mastery range. This overall low performance is supported by the mean score of 16.91, indicating that the group's letter name knowledge is far below the expected level of achievement.

The very low level of mastery observed among the respondents highlights the urgent need for improved instructional approaches and early literacy interventions. Teachers are encouraged to adopt structured and multimodal teaching strategies that emphasize systematic instruction in letter name recognition to promote greater engagement, retention, and reading readiness among early learners. Recent studies underscore the importance of early intervention, emphasizing that knowledge of letter names is a critical component of emergent literacy. Smith and Johnson (2023) found that letter name knowledge significantly predicts early reading success and the development of phonemic awareness. Their longitudinal study revealed that children with weak letter name skills often struggle with word recognition and decoding in later grades.

Table 3. Reading Performance of the Respondents in terms of Letter Sound Knowledge

Level	Score Range	Frequency	Percentage
Mastered	76-100	0	0.00
Moving Towards Mastery	51-75	0	0.00
Low Mastery	26-50	0	0.00
Very Low Mastery	0-25	22	100.00
Total		22	100.00
		Mean	**14.14**
		Level	**Very Low Mastery**

Table 3 shows that all 22 Grade II pupils (100%) from Yabbi Elementary School demonstrated *very low mastery* in their performance in terms of *letter sound knowledge*.

This finding reveals a significant deficiency in the fundamental literacy skills of the respondents, as evidenced by their extremely poor grasp of letter sounds. *Letter sound knowledge*—the understanding of the relationship between letters (graphemes) and their corresponding sounds (phonemes)—is essential for reading development, decoding, spelling, and overall literacy proficiency (Huang et al., 2014; Buckingham et al., 2019).

Table 4. Reading Performance of the Respondents in terms of Initial Sound Identification

Level	Score Range	Frequency	Percentage
Mastered	8-10	17	77.27
Moving Towards Mastery	6-7	1	4.55
Low Mastery	3-5	2	9.09
Very Low Mastery	0-2	2	9.09
Total		22	100.00
		Mean	**8.23**
		Level	**Mastered**

Table 4 shows that 17 Grade II pupils (77.27%) from Yabbi Elementary School demonstrated *mastery* in their reading performance in terms of *initial sound identification*, with scores ranging from 8 to 10. Meanwhile, 2 pupils (9.09%) exhibited *low mastery* with scores between 3 and 5, another 2 pupils (9.09%) showed *very low mastery* with scores from 0 to 2, and 1 pupil (4.55%) was *moving towards mastery* with a score range of 6 to 7. The respondents' reading performance in this area yielded a mean score of 8.23, which is described as *mastered*.

The data indicate that the majority of Grade II pupils (77.27%) have mastered the identification of initial sounds, reflecting a strong foundation in phonemic awareness. While most pupils achieved mastery, a few demonstrated varying levels of proficiency, including one pupil (4.55%) progressing towards

mastery and others showing low (9.09%) and very low (9.09%) levels of performance. The mean score of 8.23 reinforces the conclusion that, on average, the group has mastered this fundamental reading skill. Phonemic awareness, particularly the ability to identify initial sounds, is widely recognized as one of the strongest predictors of early reading success. Smith and Johnson (2023) assert that children who perform well in phonemic awareness tasks, such as identifying initial sounds, tend to become fluent readers and develop stronger comprehension skills in later grades. Their longitudinal study revealed a positive relationship between early phonemic awareness and higher reading proficiency in subsequent years.

Table 5. Reading Performance of the Respondents in terms of Familiar Word Reading

Level	Score Range	Frequency	Percentage
Mastered	37-50	2	9.09
Moving Towards Mastery	25-36	11	50.00
Low Mastery	12-24	7	31.82
Very Low Mastery	0-11	2	9.09
Total		22	100.00
		Mean	**23.64**
		Level	**Low Mastery**

Table 5 shows that 11 Grade II pupils (50%) from Yabbi Elementary School demonstrated *moving towards mastery* in their reading performance in terms of *familiar word reading*, with scores ranging from 25 to 36. Meanwhile, 7 pupils (31.82%) exhibited *low mastery* with scores between 12 and 24, while 2 pupils (9.09%) achieved *mastery* (scores 37–50), and another 2 pupils (9.09%) showed *very low mastery* (scores 0–11). Overall, the mean score of 23.64 indicates that the Grade II pupils generally possess a *low mastery* level of reading performance in familiar word reading.

Based on the data, half (50%) of the pupils are progressing toward mastery in reading familiar words, while nearly one-third (31.82%) remain at a low mastery level. Only a small proportion have reached mastery (9.09%) or remain in the very low mastery category (9.09%). The mean score of 23.64 suggests that most pupils are performing below the mastery threshold, reflecting a general difficulty in recognizing and reading familiar words fluently.

These findings align with broader educational research indicating that a significant number of beginning readers struggle to achieve proficiency in reading familiar words. This underscores the urgent need for targeted literacy interventions to strengthen foundational reading skills and support the academic growth of Grade II pupils.

Research consistently highlights the importance of early word recognition in developing reading fluency and comprehension. Smith and Johnson (2023) assert that early primary students with low proficiency in reading familiar words are more likely to experience reading difficulties in later grades. Their longitudinal study demonstrated that interventions focused on improving familiar word recognition significantly enhance reading outcomes within a single academic year.

Table 6. Reading Performance of the Respondents in terms of Invented Word Decoding

Level	Score Range	Frequency	Percentage
Mastered	37-50	0	0.00
Moving Towards Mastery	25-36	4	18.18
Low Mastery	12-24	13	59.09
Very Low Mastery	0-11	5	22.73
Total		22	100.00
		Mean	**17.77**
		Level	**Low Mastery**

Table 6 presents the reading performance of Grade II pupils in Yabbi Elementary School in terms of *invented word decoding*, which obtained a mean score of 17.77, corresponding to a *low mastery level*. Specifically, 13 pupils (59.09%) demonstrated *low mastery* with scores ranging from 12 to 24, 5 pupils (22.73%) exhibited *very low mastery* with scores between 0 and 11, and 4 pupils (18.18%) were *moving towards mastery* with scores from 25 to 36.

The data indicate that the average performance of Grade II pupils in invented word decoding falls within the *low mastery* range, with a mean score of 17.77. The distribution shows that only 18.18% of pupils are progressing toward mastery, while 22.73% scored very low and the majority (59.09%) demon-

strated low mastery. This suggests that a considerable proportion of pupils experience difficulty decoding invented words.

Given that more than 80% of the students are performing below the proficiency level, teachers at Yabbi Elementary School should implement *evidence-based phonics instruction* and provide additional support to struggling readers. Research has shown that decoding skills can be effectively strengthened through targeted interventions such as repetitive decoding practice, explicit phonics instruction, and multimodal learning strategies.

Ehri et al. (2023) emphasize that *phonological decoding* is a strong predictor of reading fluency and comprehension in the early elementary grades. Their longitudinal study demonstrated that students with low invented word decoding scores benefit significantly from focused phonics interventions. Similarly, Smith and Johnson (2024) found that early intervention programs emphasizing phonemic awareness and decoding strategies substantially improve Grade II students' ability to decode invented words, thereby enhancing overall reading competence by Grade III.

Table 7. Reading Performance of the Respondents in terms of Oral Passage Reading

Level	Score Range	Frequency	Percentage
Mastered	46-60	0	0.00
Moving Towards Mastery	31-45	10	45.45
Low Mastery	15-30	7	31.82
Very Low Mastery	0-14	5	22.73
Total		22	100.00
		Mean	**24.59**
		Level	**Low Mastery**

Table 7 shows that the reading performance of the respondents in terms of *oral passage reading* has a mean score of 24.59, which falls under the *low mastery level*.

As shown in the table, 10 pupils (45.45%) from Grade II at Yabbi Elementary School are *moving towards mastery* with a score range of 31 to 45; 7 pupils (31.82%) have *low mastery* with scores ranging from 15 to 30; and 5 pupils (22.73%) demonstrate *very low mastery*, with scores between 0 and 14.

The mean score of 24.59 indicates that Grade II pupils at Yabbi Elementary School generally perform poorly in oral passage reading. Specifically, while 45.45% of the pupils are *moving towards mastery*, a considerable proportion still struggle—31.82% exhibit *low mastery*, and 22.73% are at a *very low level*. This suggests that many pupils have not yet developed adequate oral reading skills necessary for improving fluency, comprehension, and overall literacy. The low mean score highlights the need for targeted interventions to strengthen the reading proficiency of early elementary learners. Kim and Wagner (2021) found that early intervention programs emphasizing oral reading skills significantly improve both fluency and comprehension among Grade II pupils, particularly those performing below grade level.

Table 8. Reading Performance of the Respondents in terms of Reading Comprehension

Level	Score Range	Frequency	Percentage
Mastered	6	0	0.00
Moving Towards Mastery	4-5	0	0.00
Low Mastery	2-3	6	27.27
Very Low Mastery	0-1	16	72.73
Total		22	100.00
		Mean	**1.00**
		Level	**Very Low Mastery**

Table 8 reveals that the reading performance of the respondents in terms of *reading comprehension* among Grade II pupils at Yabbi Elementary School has a mean score of 1.00, which falls under the level of *very low mastery*.

Specifically, the table shows that 16 pupils (72.73%) have *very low mastery* with scores ranging from 0 to 1, while 6 pupils (27.27%) have *low mastery* with scores between 2 and 3.

According to the data, the reading comprehension level of Grade II pupils at Yabbi Elementary School is very low, as reflected by their overall mean score of 1.00. This indicates that most pupils experience significant difficulties in understanding reading materials appropriate for their grade level, which may negatively affect their overall academic performance and literacy development.

It is therefore recommended that evidence-based reading interventions be implemented at Yabbi Elementary School to address these low levels of competence. With consistent assessment and expert instructional support, pupils' reading comprehension can be improved. These findings align with recent studies underscoring the critical importance of early intervention in reading comprehension to prevent long-term academic challenges. For instance, Smith and Johnson (2023) found that poor reading comprehension among early-grade students often leads to difficulties in other academic areas, and that targeted instructional strategies are vital for improving mastery levels. Similarly, Lee et al. (2024) demonstrated that systematic reading programs focusing on vocabulary development and comprehension strategies significantly enhance the reading performance of elementary pupils who initially exhibit low comprehension skills.

Table 9. Reading Performance of the Respondents in terms of Listening Comprehension

Level	Score Range	Frequency	Percentage
Mastered	5	1	4.55
Moving Towards Mastery	4	6	27.27
Low Mastery	3	6	27.27
Very Low Mastery	0-2	9	40.91
Total		22	100.00
		Mean	**2.95**
		Level	**Low Mastery**

Table 9 displays the reading performance of the Grade II pupils in Yabbi Elementary School in terms of *listening comprehension*, which has a mean score of 2.95, corresponding to a low mastery level.

Specifically, 9 pupils (40.91%) demonstrated *very low mastery* with scores ranging from 0 to 2; 6 pupils (27.27%) were *moving towards mastery* with a score of 4; another 6 pupils (27.27%) exhibited *low mastery* with a score of 3; while only 1 pupil (4.55%) achieved *mastery* with a score of 5.

The results indicate that Grade II pupils at Yabbi Elementary School generally possess low mastery in listening comprehension, as reflected by their mean score of 2.95. This suggests that most pupils have not yet developed adequate listening comprehension skills. Given that 40.91% of the students are in the very low mastery range, it is evident that many require targeted instructional support.

Recent research underscores the critical role of listening comprehension in fostering reading fluency and academic achievement. Smith and Johnson (2023) found that early listening comprehension skills strongly predict later reading proficiency and general academic performance. Their findings emphasize that children who struggle with listening comprehension often experience difficulties in decoding and understanding text, hindering literacy growth.

Problem 2. Based on the reading performance level of the respondents, what instructional technology resources using Marungko approach could be developed?

Based on the findings of the study, it was revealed that the Grade II pupils demonstrated very low mastery in reading performance, particularly in letter sound knowledge, letter name knowledge, and reading comprehension. Hence, using the Marungko Approach, instructional technology resources, specifically video lessons and a digitized big book, were developed to enhance the reading performance of Grade II pupils in these three areas. Consequently, these instructional technology resources can serve as supplementary learning materials that teachers may use to support pupils' reading development. The instructional materials were designed and developed in alignment with the three reading components where the respondents showed the lowest performance. Specifically, video lessons were created to address letter sound knowledge and letter name knowledge, while a digitized big book was developed to improve reading comprehension. In line with this, Laurente (2021) underscored that the use of video lessons in the Marungko Approach enables students to correctly pronounce letters and words, which is a highly valuable skill in the pandemic era when students relied on parents or guardians for help in developing basic reading proficiency.

The video lesson titled, "Pagbigkas ng Tunog ng mga Letra" (Pronunciation of Letter Sounds) aims to help young learners develop foundational reading skills using the Marungko Approach. The lesson focuses on three main objectives: A) Matukoy ang tamang tunog ng mga letra sa Alpabetong Filipino ayon sa pagkakasunod-sunod ng Marungko Approach; B) Mabigkas ng wasto ang tunog ng mga letra; and C) Magamit ang tamang tunog ng mga letra sa pagbasa ng mga salita.. The lesson helps pupils in

recognizing each letter and pronouncing it properly, focusing on phonics to build strong reading and speaking skills.

The video lesson titled, "Pagbabaybay ng mga Salita" (Spelling of Words) focuses on enhancing learners' letter name knowledge as a foundation for effective spelling in Filipino. Using the Marungko Approach, the lesson guides pupils to: A) Matukoy ang pangalan ng bawat letra sa Alpabetong Filipino ayon sa pagkakasunod-sunod ng Marungko Approach; B) Mabaybay ng wasto ang mga salitang may 2-4 na pantig; and C) Mabigkas ng tama ang pangalan ng mga letra sa pagbabaybay ng salita. The lesson emphasizes the importance of recognizing and articulating letter names as a key skill in spelling development. Through clear demonstrations and examples, learners build confidence and accuracy in spelling words aloud.

The digitized bigbook entitled, "Ang Pagtuklas ni Mikoy sa mga Natatanging Kayamanan" features a culturally rich story highlighting the rich culture and traditions of the community in Barangay Yabbi with special emphasis on bayanihan or the spirit of helpfulness and unity. Through vibrant illustrations and texts, the story highlights how the people of the community come together to support one another in times of need-whether during planting season, local celebrations, or community projects. Designed to promote both literacy and cultural appreciation, the big book encourages young readers to value cooperation, kindness, and the importance of working together for common good.

CONCLUSIONS

Based from the significant findings of the study, the following conclusions were drawn.
1. The Grade II pupils at Yabbi Elementary School have very low mastery in reading along letter sound knowledge, letter name knowledge, and reading comprehension.
2. The findings of the study led to the development of instructional technology resources particularly video lessons and digitized big book aimed at enhancing pupils' reading abilities.

RECOMMENDATIONS

Based from the significant findings and conclusions drawn, the following recommendations are offered:
1. In as much that the Grade II pupils at Yabbi Elementary School have low performance in reading especially on letter sound knowledge, letter name knowledge, and reading comprehension, the pupils may be given more exercises and engaging activities along these areas in order to help them enhance their skills. The teachers may integrate lessons along these areas.
2. The teachers may use the developed instructional technology resources as the output of this study to be used as supplementary reading materials in order to improve the reading performance of the pupils. Also, these developed instructional technology resources can be disseminated and shared to Grade II teachers in the district and in other districts.
3. The developed instructional technology resources may be evaluated for enhancement purposes.
4. Other researchers may conduct similar studies like effectiveness of the developed instructional technology resources using Marungko Approach to improve the reading performance of the pupils.

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EFFECTIVENESS OF DIGITAL STORYTELLING IN IMPROVING THE LITERAL COMPREHENSION SKILLS OF GRADE VI PUPILS

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ABSTRACT

The study ascertained the effectiveness of digital storytelling on the literal comprehension skills of Grade VI pupils. This study used a quasi-experimental method, involving 25 sixth graders in Buyasyas Elementary School identified purposively using total enumeration. Five Phil-IRI-patterned stories were developed and validated by a panel of reading experts. Each story was accompanied by six literal comprehension questions adapted from Llego's (2023) framework. After implementing digital storytelling activities and materials, a parallel set of five stories was administered as a posttest. Both the pre- and posttests consisted of 30 questions each based on Phil-IRI criteria. The results indicated that pupils progressed from a frustration level in the pretest to independent reading proficiency in the posttest.

Keywords: digital storytelling, literal comprehension, Phil-IRI patterned stories, reading proficiency

INTRODUCTION

Part of the life of every individual and fundamental for functioning in the world is communication. There was and still is a continuous need for communication. It starts when a person is born and continues throughout his entire life. Without it, he could never write a word, nor could he solve a problem.

Among the macro skills in communication, reading has remained a persistent concern of educators, although it has to be intertwined with listening, speaking, writing, and viewing. Listening is needed because pupils have to hear the sound of letters and words. Speaking is necessary because they have to pronounce the letters and words. Writing is essential because they need to put on paper what they have listened to and spoken. Viewing is important because they have to see the form or shape of letters and configure words.

According to Raza (2023), reading requires understanding letters and symbols to derive meaning. Therefore, it is a thinking process. It involves the use of themes to organize ideas or textual clues to find the meanings of new words. When learners read with a purpose, it becomes easier for them to achieve their goal, whether it is to gather information or refresh their memory for review.

Luciano (2020) added that the importance of reading cannot be overemphasized. Former Education Secretary Bro. Armin Luistro cited that if learners' reading skills are poor, they will struggle in other academic disciplines. Ivalcutt, as cited by Cristobal (2015), maintained that reading brings us to a dimension of artistry that cannot be fathomed by mere physical experience. It brings life to imagination. Reading unlocks a thousand doors to life. One may not be a teacher, a doctor, a bar topnotcher, a scientist, or anyone successful in a career or occupation were it not for that thing called "reading."

However, Carl (2018) emphasized that the goal of reading is not the mere recognition of printed symbols or the accumulation of isolated reading skills. Unless the reader can apply the perceptual, syntactic, semantic, and metalinguistic processes to obtain meaning and draw a unified thought from what he reads, he is not truly reading. In other words, a reader should be able to interpret words as part of the sentence, sentences as part of the paragraph, and paragraphs as part of the selection. Simply put, this is what is termed comprehension.

Carl (2018) added that there are five dimensions of reading comprehension. The first is literal comprehension, which refers to the recognition of facts and answers to questions usually found in the first few paragraphs. The second is inferential comprehension, which includes interpretation and the implied

meaning of the text. The third is critical evaluation, which involves the reader's reaction. The fourth is application and integration, which is the ability to link the material read to personal experiences to gain new insights and understanding. The fifth is creativity, which allows the reader freedom of expression and requires him to compose unique communication, devise a proposed procedure, or derive relationships. Activities such as dramatization, choral reading of poems, presenting a pageant, or writing a story, verse, or prayer are included in this dimension.

Davis (2015) asserted that literal comprehension occurs when understanding is limited to answering the what, why, where, when, and how questions. It is the lowest in the hierarchy of reading comprehension levels and, therefore, the most basic. Thus, it must be taught and mastered. Literal comprehension applies perceptual, syntactic, and semantic aspects of comprehension. The reader must be able to locate the answer to a main idea, note supporting details, sequence events, and answer recall questions such as "what," "who," "where," "when," and "how."

Lamentably, educators have been alarmed by the persistent decline in the reading comprehension levels of pupils. Dewitz and Dewitz (2015) found that pupils could read words but could not understand them. Asikcan and Saban (2021) added that even if children learn to read, they experience difficulty reading fluently and face problems understanding what they read.

The latest World Bank report (2022) revealed that nine out of ten Filipino children aged 15 struggled to read simple text during the pandemic, compared to seven out of ten before COVID-19. This finding was confirmed by the 2022 Program for International Student Assessment (PISA), which found that only 24% of 15-year-old Filipino students gained proficiency in reading. The Philippines ranked 77th out of 81 countries, indicating a five-to-six-year lag in learning competencies. In other words, education in the Philippines continues to decline, particularly in reading, mathematics, and science, showing no significant improvement from the 2018 PISA results.

On the brighter side, some studies revealed contradictory findings. For instance, the reading comprehension of Indonesian pupils improved after the implementation of the reciprocal teaching strategy. In Singapore, recreational reading encouraged the development of reading habits. In Malaysia, various technology-based teaching and learning approaches benefited different aspects of learning (Ardiansya & Ujihanti, 2020).

In the Philippines, Bagolong and Usop (2020) emphasized that reading among elementary pupils is crucial because it is where reading instruction starts. Nonetheless, it was documented that pupils had poor reading skills, particularly in phonemic awareness and reading comprehension. To address this, they proposed Project Kasiyahan sa Pagkatuto sa Pagbasa (ICPP). The project aimed to improve reading skills by 75% by the end of the school year.

On January 10, President Ferdinand Romualdez Jr. issued an order to education officials, through the leadership of Vice President and Education Secretary Sara Z. Duterte, to initiate programs aimed at improving the quality of instruction through the "Catch-up Fridays" program. This new initiative by DepEd sought to address learning gaps in reading proficiency, values education, health education, and peace education. The list of reading intervention activities included the use of flashcards, singing songs, playing games, using digital materials and ICT platforms, and other methods to activate learners' prior knowledge. These were followed by reading-time activities that helped pupils visualize scenes, characters, and situations, and identify main ideas and supporting details (DepEd Memorandum No. 001, s. 2024).

Everyday experiences of people are different forms of narration. Whether relayed as fiction, nonfiction, or historical narrative, these stories impart messages and information that evoke enjoyment, questions, and reflections. Narrating past events helps people share lessons they have learned, unload their pains, and express their humanity with those who choose to listen or read. As Robert McKee, as cited by Castillejos (2016), expressed, stories transform a person's personal experiences when shared with others. Honeyghan (2000), also cited in Castillejos (2016), articulated that life stories touch everyone. They spark thoughts and emotions in people as they respond to characters and events. Stories come alive not only in the imagination but also in the spirit. Joy, sorrow, pleasure, anger, triumph, disappointment, confusion, certainty, courage, and cowardice are all experiences familiar to people and cultures throughout the ages.

Storytelling is probably one of the earliest forms of entertainment. It also verifies understanding by sharing what has been read or retelling it in sequence. It develops oral language skills. It serves as a way to bridge apparent cultural divides through different interpretations of stories. It helps learners link what

they read to their own experiences, whether through oral or written expression, and supports their success in academic endeavors (Craig et al., 2014).

Craig et al. (2014) added that teachers use storytelling as an informal assessment to determine a student's level of understanding of a text. It provides a collaborative link to the general education classroom. It brings opportunities for learners and teachers to engage with reading. It also shares the cultures of others with learners, allowing them to learn and appreciate these differences.

At the onset of the so-called "digital age," digital storytelling emerged as one of the ICT tools used to enrich pupils' reading comprehension. It allowed pupils to read using multimedia elements like images, videos, audio recordings, and text presented in digital format (McLaughlin Library, 2022).

Hamdy (2017) reiterated Robin's (2016) assertion that digital storytelling was one of the popular methods for teaching students. Studies have shown that it promoted optimum learning by allowing students to interact with the narrative, explore different paths such as simulating historical events, create or develop their own digital stories, apply knowledge creatively, and analyze multimedia elements like visuals and audio to gain information. It was also used to validate students' understanding of lessons by translating key concepts into narrative form or showing their grasp of the material through the story's content.

Nemours Children's BrightStart (2023) explained that repetitive exposure to tools like digital storytelling enhanced fluency through cognitive mechanisms such as automaticity. With frequent practice, skills became effortless and ingrained, freeing up cognitive resources for higher-order thinking. In English reading comprehension, repeated exposure to tools like interactive reading games automated word recognition and decoding, allowing students to focus on comprehension strategies and deeper understanding.

Integrating digital storytelling into instruction yielded positive effects on pupils' literal comprehension. It increased engagement and focus, allowing for better processing and retention of information. It promoted visual and auditory reinforcement through a multisensory experience that reinforced understanding. It improved vocabulary and fluency through exposure to rich vocabulary and different storytelling styles. It also boosted motivation and confidence by making reading more enjoyable and less intimidating (Bouchrika, 2024).

However, it was observed that many schools, especially in rural areas, continued to demonstrate poor reading comprehension even at the literal level. The information about digital storytelling triggered the researcher's curiosity and interest in uncovering its potential to improve literal comprehension. Moreover, the conduct of this study aligned with various educational agendas aimed at enhancing English reading comprehension skills.

The study aligned with the DepEd Teaching and Learning Agenda, which provides innovative techniques and approaches for DepEd teachers to cultivate pupils' higher-order thinking skills in literal reading comprehension. It also aligned with the College of Teacher Education Research and Development Agenda, which aimed to enhance the English reading comprehension of Grade 6 pupils at Buyasyas Elementary School and impact their academic performance and future success. This targeted instruction in literal comprehension specifically addressed the needs of pupils struggling with reading comprehension. The study supported the National Research Agenda of Teacher Education (NRATE), which explores pedagogical approaches, assessment strategies, and innovative teaching-learning methods to cultivate 21st-century competencies and fluencies. It contributed to navigating the unknown in educational practices within the K–12 program and aligned with the Philippine Professional Standards for Teachers.

The study was conducted to address a research gap. While previous researchers focused on reading comprehension and the use of ICT in teaching, this study focused specifically on literal comprehension and the use of digital storytelling materials, as well as their effectiveness in improving pupils' literal comprehension.

STATEMENT OF THE PROBLEM

The study determined the effectiveness of digital storytelling in improving the literal comprehension level of Grade VI pupils of Buyasyas Elementary School.

Specifically, this study sought answers to the following research questions:
1. What is the level of literal comprehension skills of the Grade 6 pupils before using digital storytelling?

2. What is the level of literal comprehension skills of the respondents after using digital storytelling?
3. Is there a significant difference between the level of their literal comprehension skills before and after using digital storytelling?

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METHODOLOGY
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Research Design

The study utilized a quasi-experimental method to collect numerical data to draw conclusions and propose recommendations.

Research Environment

Buyasyas Primary School is located in Sitio Parago, Barangay Buyasyas. It was established by Mr. Castro Nuevo in 1948 with only a Grade I class consisting of 30 pupils, most of whom were overaged. Later, Mr. Juan Saladino took over for almost nine years, handling Grades I to IV. Until more teachers from Aritao joined. Currently, the school is under the leadership of the teacher-in-charge, Mrs. Nieves Barreda.

The researcher chose to conduct this study in Buyasyas Elementary School because of its potential to become a high-performing learning institution. This potential is supported by a dedicated and cooperative school administrator, committed teachers, and active participation from barangay officials and community members.

With the school's increasing enrolment, it is important to address the growing educational needs of the pupils through innovative teaching strategies such as digital storytelling. This strategy can inspire school leaders and teachers to seek resources to acquire digital facilities and internet access for both pupils and staff. Most importantly, the researcher selected this school because she is a native of the barangay and is familiar with the current situation and challenges faced by the school and its learners.

Respondents of the Study

The respondents of the study are the twenty-five (25) Grade VI pupils enrolled at Buyasyas Elementary School. The group of male respondents has a population of 13, while the group of female respondents has a population of 12.

Research Instrument

To gather relevant data to answer the research questions presented in Chapter 1, two sets of paragraphs were prepared. These were patterned after the materials developed by Llega (2023). The first set consisted of five paragraphs, each followed by six literal comprehension questions. This set was given to the respondents as the pretest. The second set, also made up of five paragraphs with six questions each, was administered as the posttest. The pupils' scores were collected and interpreted using the scale shown below.

$$RC \quad \frac{\text{Total correct answer}}{\text{Total number of items}} \quad X100$$

Below is the test criteria for literal comprehension (Adapted from Phil-IRI):

Level	Comprehension
Independent	80-100 %
Instruction	59-79 %
Frustration	58 % - below

Statistical Treatment of Data

Frequency and Percentage Count. This was used to show the number of students that fall under the three levels of literal comprehension for the pretest and posttest.

Mean. This was utilized to determine the literal comprehension level of the respondent for pretest and posttest.

t-test. This was employed to determine whether significant difference exists between the pretest and posttest scores of the respondents.

RESULTS AND DISCUSSION

This section of the paper presents the results of the statistically treated data to answer the problems enumerated in Chapter 1. The presentation starts with the statement of the problem, the statistical tool used, the results in tabular form, and the analysis and interpretation of the results and insights to support the findings.

1. The level of literal comprehension skills of the Grade VI pupils before using digital story telling

To answer this problem, the mean of the first set of paragraphs was computed and was transmitted according to DepEd's transmutation table. The result is exhibited in Table 1.

Table 1. Level of Literal Comprehension Skills of the Grade 6 Pupils before Using Digital Storytelling

Level	Grading Scale	Frequency	Percentage
Independent	80-100 %	0	0
Instructional	59-79%	6	24
Frustration	1-58%	19	76
	Total	25	100
		Pretest Mean Rating	50.80
		Standard Deviation	10.42
		Qualitative Description	Frustration

It can be gleaned from table 2 that the majority of the respondents, comprising 19 or 76%, obtained a mean rating of 50.80 in the pretest. This falls under the 1–58% grading scale, which is qualitatively interpreted as the frustration level, with a standard deviation of 10.42. This means that the data are clustered around the mean. Six respondents, or 24%, fell under the 59–79% grading scale, which is interpreted as the instructional level.

This finding suggests that the readers experienced difficulty in reading texts that were challenging for their current reading abilities. The words seemed unfamiliar to them. They had limited or no prior knowledge of the topic they were reading. They lacked phonemic awareness, verbal reasoning, sight word recognition, and understanding of basic language structures. They also showed difficulty in recognizing basic vowel and consonant sounds, often mixed up the sequence of letters in words, omitted or added sounds, or confused similar-looking words.

In terms of comprehension, the pupils struggled to understand the meaning behind words, phrases, and texts. These difficulties were due to problems in letter and word recognition. Their vocabulary was limited, and they could not recall what they had read. As a result, they were unable to answer literal comprehension questions.

The frustration level of the respondents may imply that there are several factors affecting their literal reading comprehension. Nemours Kids Health (2023) and Nixon (2024) suggested that pupils may have processing difficulties, such as problems in tracking words or lines of text, which disrupt reading fluency and comprehension. Thomas et al. (2017) and Chan (2017) attributed poor comprehension to instructional factors, including limited exposure to printed materials, inadequate reading instruction, and unengaging texts. Johnson and Brownie (2023) connected it to limited access to books and educational resources, as well as language differences.

According to the University of Utah Reading Clinic (2022), a frustration level occurs when learners are unable to read a text and answer questions as required. The text becomes too difficult for them to decode, grasp the main idea, or answer questions related to the passage. As a result, they cannot understand the explicit meaning of the text (Victoria State Government, 2019).

Nowak (2023) described poor literal comprehension as a learning disability. He listed several signs of reading comprehension difficulties, including the inability to decode words, concentrate on reading, follow instructions, and recognize words and phonemes.

The result and discussion imply the need for an effective intervention program that can help address the learners' low literal comprehension level.

Supporting this implication is the study of Acedillo and Sara (2023), who evaluated the reading comprehension level of Grade V pupils using contextualized reading materials. Their findings revealed that the 121 pupil-respondents were capable of reading and comprehending, and there were no non-readers.

This was attributed to the use of contextualized materials. Likewise, Bilbao et al. (2016) revealed that education students showed instructional level reading comprehension. Nurjanah and Putri (2022) concluded that mastery of literal comprehension skills influences the next three levels: interpretative, critical, and creative.

2. The level of literal comprehension skills of the Grade 6 pupils after using digital story telling

To come up with the answer to this question, the mean of the literal comprehension of the pupils in the posttest was computed. The result is displayed in Table 2.

Table 2. Level of Literal Comprehension Skills of the Grade 6 Pupils After Using Digital Storytelling

Level	Grading Scale	Frequency	Percentage
Independent	80-100 %	25	100
Instructional	59-79%	0	0
Frustration	1-58%	0	0
	Total	25	100
Post Mean Rating			94.93
Standard Deviation			4.52
Qualitative Description			Independent

After employing digital storytelling as an intervention program, there was a significant improvement in the literal comprehension level of the respondents compared to the pretest. From being at the frustration level, the results greatly improved to the independent level, as supported by the mean score of 94.93. As shown in table 3, 100% of the respondents scored within the 80–100% range in the grading scale. None of them fell into the instructional level or remained at the frustration level.

After implementing the intervention, the pupils were able to understand the explicit meaning of the text and could correctly answer simple 5WH questions within a few minutes. This finding suggests that they can now read "on the lines" or comprehend literal text effectively, which can be attributed to digital storytelling as the instructional strategy.

It can be inferred that the respondents improved significantly after their exposure to digital storytelling—from being in the frustration level to reaching the independent level in reading comprehension. This could mean that the respondents became more knowledgeable in the syntactic, semantic, and structural aspects of the language. These skills helped them achieve the standard accuracy and reading rate expected at their grade level. Specifically, they can now decode and comprehend texts independently, including multi-syllabic words. The respondents may have developed a broader vocabulary, which contributes to their better comprehension and ability to answer different levels of questions, either independently or with minimal assistance.

The University of Utah Reading Clinic (2022) described the independent level as the highest level of reading comprehension. A reader at this level has adequate background knowledge of the topic and can access text quickly with few errors. The reader can answer comprehension questions accurately and is likely to read fluently. At this level, the reader may encounter no more than one unfamiliar word in every twenty words, achieving 80–100% accuracy. This enables them to read independently with very little or no instructional support.

However, this finding contrasts with the study of Alerta and Segumpan (2022), who developed guided reading lessons using digital stories. They used PHIL-IRI to assess the reading performance of the students. The result showed that students were at the frustration level. This served as input for designing guided reading lessons with digital stories. The materials they developed were assessed to possess the effective qualities of print resources.

On the other hand, Mayorga et al. (2022) found that students' reading comprehension improved significantly after using digital storytelling in their reading class. Similarly, Murgayyah (2022) reported that many of the students she interviewed said that digital storytelling was enjoyable and fun due to the use of videos and images. Others mentioned that it was interesting, helped reduce boredom, and sparked their creative imagination. Overall, it helped attract students' attention and increased their engagement in learning narrative text reading comprehension.

3. Comparison of the levels of literal comprehension skills in English text before and after the digital story telling?

To arrive at the answer to this problem, the pretest-posttest results were compared with the use of t-test. The result of which is displayed in Table 3.

Table 3. Summary of t-test Computation on the Levels of Literal Comprehension Skills in English Text before and after the Use of Digital Storytelling

Test	Mean	Computed t-Value	p-value	Remarks
Before digital storytelling	50.80	20.49	0.000	Significant
After digital storytelling	94.93			

There is clear evidence of a significant difference between the pretest and posttest scores of the respondents. This is supported by a computed t-value of 20.49 and a p-value of 0.000, which is lower than the significance level of 0.05. Before the use of digital storytelling, the mean score was 50.80, which falls under the frustration level. After the intervention, the mean score rose to 94.93, categorized as the independent level. The 44.13-point difference resulted in the t-value of 20.49 and the p-value of 0.000. This led to the rejection of the null hypothesis. Therefore, the result confirms that digital storytelling is effective in improving the respondents' literal comprehension.

In line with this finding, Hadi (2023) explained that digital storytelling improves students' reading comprehension at various levels. First, it supports literal comprehension by combining visual and auditory elements that help learners understand the story. Second, it strengthens recognition skills as students interact with the structure and content of the story. Third, it enhances inferential comprehension by encouraging learners to draw conclusions and make connections. Fourth, it supports evaluative comprehension by prompting students to analyze and assess the story's message. Finally, it fosters appreciative comprehension by making learning enjoyable and engaging.

Supporting this, Mayorga et al. (2022) suggested using digital storytelling in a virtual classroom setting to help learners develop reading comprehension. She described digital narratives as online stories that learners can watch and listen to. These are creatively designed to engage students and enhance their cognitive development.

On the other hand, Hamdy (2017) initially reported a null hypothesis. However, after using digital storytelling, the results revealed a significant difference in the posttest mean scores in both reading and listening comprehension. The experimental group outperformed the control group. This indicates that digital storytelling positively affects both reading and listening comprehension.

In the local context, Estanislao (2023) studied the impact of digital storytelling on the reading comprehension of Grade 7 pupils in Agusan del Norte. Before the intervention, 100% of the pupils were in the frustration level. After the use of digital storytelling, only eight pupils remained at the frustration level, while 16 reached the independent level. A significant difference between their pretest and posttest results was observed. Hence, the study concluded that digital storytelling is an effective method in improving students' reading comprehension, including literal comprehension.

CONCLUSION

Based on the significant findings of the study, the following conclusions were drawn:
1. At the beginning of the study, the respondents were at the frustration level of literal comprehension, indicating difficulty in understanding and answering literal questions from the text.
2. After the intervention, the respondents' performance improved significantly, moving from the frustration level to the independent level of literal comprehension.
3. The use of digital storytelling as a teaching strategy had a significant positive effect on the respondents' literal comprehension. The posttest mean score was significantly higher than the pretest mean score, proving that digital storytelling is an effective tool for enhancing literal comprehension among Grade 6 pupils.

RECOMMENDATIONS

In light of the significant findings and conclusions, the following recommendations are offered:

1. The integration of digital storytelling into the elementary level curriculum may be considered to enhance pupils' comprehension across various subject areas.
2. School administrators may seek support from higher authorities, government agencies, and other stakeholders to provide the necessary technological resources such as devices and internet connectivity to effectively implement digital storytelling in classroom instruction.
3. Continuous assessment and monitoring of pupils' reading performance may be conducted to determine their progress and provide meaningful feedback for improvement.
4. The replication of this research may be undertaken by future researchers, including other levels of reading comprehension such as inferential, creative, critical, integrative, and organizational or other factors that influence reading comprehension development.

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AGRICULTURAL CROP PRODUCTION INSTRUCTIONS IN RURAL FARM SCHOOLS IN THE DIVISION OF CAVITE, PHILIPPINES

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ABSTRACT

This study aimed to explore Agricultural Crop Production (ACP) instructions in rural farm schools within the Division of Cavite during the pilot phase of the Rural Farm School, SY 2023-2024. It focuses on teachers' profiles, their lived experiences, and the challenges they encountered in the implementation of rural farm schools. This study used a descriptive qualitative research design, employing purposive sampling to select participants. Eight TLE teachers participated from four rural farm schools in the Division of Cavite. Data was gathered through interviews, and thematic analysis was used to interpret the findings. Results showed most participants held master's degrees in various disciplines, with one possessing a Master of Arts in Agriculture. Teaching experience ranged from 11 to 24 years, with some educators having specialized agricultural knowledge. Few had professional agricultural experience, and attendance at relevant seminars varied. Participants' experiences in establishing Rural Farm Schools illustrate ACP teachers' commitment to enhancing student selection and engagement in agriculture. As part of their lived experience, they navigated the challenges of document preparation by working closely with colleagues, administrators, and students. Their deep passion for farming and teaching fueled their efforts, strengthened by the support of school administrators and local government authorities. Key issues included limited finances, inadequate tools, unclear guidelines, and learning materials, hindering effective school establishment, teaching processes and operation across institutions.

Keywords: Agricultural Crop Production, Rural farm School, intervention materials, TLE Teachers, Agriculture Education

INTRODUCTION

Despite the vital role of agriculture in the Philippine economy, agricultural education, particularly in rural areas, faces significant challenges. While the K–12 curriculum includes a Technical-Vocational Livelihood (TVL) track to prepare students for practical careers, agricultural subjects often suffer from low student engagement and ineffective teaching methods. This problem is intensified in Rural Farm Schools, which were established to promote sustainable agriculture and support rural development but still struggle with limited resources and inadequate teacher preparation (Gepila Jr., 2019; Malunes & Dioso, 2020; Republic Act No. 10618).

One major issue is the insufficient training of teachers assigned to agricultural education. Many educators lack specialized knowledge and pedagogical skills to deliver hands-on, experiential learning critical to this field. One major constraint to effective agricultural education is the insufficient professional preparation of teachers assigned to this field. Studies consistently show that many agriculture teachers lack both specialized content knowledge and pedagogical content knowledge (PCK), making it difficult for them to design and deliver hands-on, experiential learning, while beginning and non-specialist teachers often struggle with managing laboratory or field activities and translating technical concepts into practice. Evidence from the Philippines and other low-resource contexts further highlights gaps in TLE/TVL teachers' technical competencies and limited access to in-service training, underscoring the need

for stronger pre-service preparation, targeted professional development, and system-level support for school-based agricultural facilities. Shoulders, C. W., & Myers, B. E. (2013). As a result, students often miss out on meaningful learning experiences that connect theoretical knowledge to real-world agricultural practices. This gap hinders the development of competencies needed for sustainable farming and agribusiness, weakening efforts to address food security and rural economic growth (Gepila Jr., 2019; Darko et al., 2015).

Furthermore, the teaching strategies employed tend to be traditional and rigid, leaving little room for innovation, cultural relevance, or student-centered approaches that could better engage learners. Practical challenges such as limited facilities, scarce instructional materials, and inadequate access to modern technology exacerbate the problem. These factors contribute to a learning environment that fails to fully prepare students for the demands of modern agriculture (DepEd Order No. 36, s. 2015).

Although Rural Farm Schools offer an important platform for integrating agricultural education with community development, their effectiveness depends heavily on teacher readiness. Many teachers face difficulties in balancing academic instruction with practical training due to insufficient preparation and support. Without targeted professional development and updated instructional materials, these schools cannot reach their full potential in empowering students and revitalizing rural economies (Malunes & Dioso, 2020; DepEd Region IV-A).

Given these challenges, this study sought to investigate Agricultural Crop Production instruction within Rural Farm Schools in the Division of Cavite. The research aims to understand teachers' profiles, their lived experiences, and the obstacles they encounter in delivering effective agricultural education. It also intends to develop intervention materials to enhance teaching practices and improve student outcomes, ultimately contributing to sustainable rural development. Findings from this research will provide teachers with evidence-based insights and practical intervention materials that can strengthen their instructional skills and confidence in delivering Agricultural Crop Production. For students, the study offers the potential to improve their hands-on learning experiences, skill mastery, and preparedness for agricultural livelihood opportunities essential to rural community development.

STATEMENT OF OBJECTIVES

This study aimed to explore the Agricultural Crop Production instructions in rural farm schools in Division of Cavite during the pilot implementation of Rural Farm School for the School Year 2023-2024.

Specifically, it sought to attain the following objectives:
1. Describe the profile of the respondents relative to
    1.1 highest educational attainment
    1.2 teaching Experience
    1.3 work experience related to Agriculture (if any)
    1.4 seminars attended and
    1.5 specialization.
2. Explore the lived experiences of the participants in the establishment of rural farm school.
3. Identify the issues and challenges faced by the participants of the rural farm school establishment
4. Prepare intervention material in establishing rural farm schools as part of ACP instruction.

METHODOLOGY

The study utilized a descriptive qualitative research design, employing interviews as the data-gathering instrument. This approach was chosen to explore the delivery of Agricultural Crop Production instruction in rural farm schools in the Division of Cavite during their pilot implementation. Descriptive research allowed the collection of in-depth information to gain a clearer understanding of current practices and challenges. To interpret the qualitative data, thematic analysis was applied, following the updated approach of Braun and Clarke (2021). This method involved identifying, analyzing, and reporting recurring patterns or themes in the data, providing both detailed descriptions and interpretations of the teachers' experiences.

The participants of the study were eight (8) TLE teachers who handles and coordinates Agricultural Crop Production from four rural farm schools and were purposively selected. Interviews were conducted, transcribed, and coded to ensure accuracy and completeness. The data were analyzed thematically, and results were presented in themes derived from participants' responses. Ethical considerations were observed in accordance with the Data Privacy Act of 2012, including informed consent, confidentiality, and respect for participants' rights throughout the research process.

FINDINGS

From the gathered data, the following findings were obtained:

1. Profile of the Participants

1.1 Educational attainment. Most Agricultural Crop Production teachers hold Master's degrees in various fields, underscoring staffing challenges in specialized areas. This supports Darling-Hammond's (2017) view that subject-specific training enhances teaching quality. However, due to shortages, many are assigned outside their expertise, which may affect instructional depth (OECD, 2019; Ingersoll & Perda, 2010).

Table 1. Highest Educational Attainment of the Participants

Participants/s	Highest Educational Attainment
P1	MA graduate with a relevant specialization
P4, P6, P7, P8	MA graduate with a different specialization
P2, P3	Earned MA units with a relevant specialization
P5	Bachelor's degree with a relevant specialization

Only one participant (P1) has a Master's in Agricultural Crop Production, while others (P4, P6, P7, P8) hold degrees in unrelated fields, suggesting assignments driven by availability rather than subject alignment. Some (P2, P3) are pursuing relevant graduate studies, reflecting ongoing efforts to build expertise (Gore et al., 2017). Meanwhile, P5, with only a Bachelor's in the field, illustrates recruitment constraints in technical education (Schleicher, 2018).

1.2 Teaching experience. Most Agricultural Crop Production teachers are highly experienced, with several having over 20 years and others between 11 and 19 years of teaching. This experience likely influences their assignment to the new Farm School.

Table 2. Years in Teaching Experience of the Participants

Participant/s	Years in Teaching Experience
P1, P2, P3, P4, P5	11-19
P6, P7, P8	20 – above

Research shows that seasoned teachers enhance vocational education by adapting strategies to student needs, improving engagement, and fostering better learning outcomes (Darling-Hammond, 2017; Kraft, Blazar, & Hogan, 2018; Guskey, 2014). Their expertise also supports curriculum development and program sustainability (Borko, 2016; Darling-Hammond & Bransford, 2019).

1.3 Agricultural work experience. Most participants lack practical agricultural experience, relying mainly on theoretical knowledge (P2, P3, P4, P5, P7, P8). Only P6 has limited experience (1 year), while P1 stands out with 10 years, likely enhancing their applied teaching approach.

Table 3. Work experience related to agriculture of the Participants

Participant/s	Work experience
P2, P3, P4, P5, P7, P8	No Work Experience
P6	1 Year of Experience
P1	10 Years of Experience:

This gap may limit teachers' ability to connect theory with real-world practice, which is essential for effective vocational education and competency development (Darling-Hammond, 2017; OECD, 2019; Schleicher, 2018). Teachers with industry experience are better able to create engaging, relevant lessons that boost student motivation and workforce readiness (Gore et al., 2017).

1.4 Seminars attended. Participants show varied professional development, with some attending multiple specialized trainings and others, like P5, none at all, indicating potential gaps in updated teaching methods (Darling-Hammond, 2017). P1 has the most extensive certifications, including Organic Agriculture NCII, Agricultural Crop Production NCII, and Trainers Methodology I, supporting OECD's (2019) view that formal training improves industry-relevant instruction.

Table 4. Seminar Attended related to Agriculture of the Participants

Participant/s	Seminar Attended
P5	No Seminar attended
P1	Organic Agriculture NCII
P1	Agricultural Crop Production NCII
P2, P3	Horticulture NCII
P1	Agri-crop Production NCII
P1	Trainers Methodology 1
P4	Seminar in Gulayan sa Bahay
P6	Aquaculture
P6	Organic Agriculture Production
P7	Freshwater Aquaculture and Fisheries Post-harvest technologies
P2, P3	Naturally Grown Vegetable Production

P2 and P3 completed Horticulture NCII and sustainable farming trainings, while P4, P6, and P7 gained skills in small-scale vegetable production and aquaculture, reflecting diverse expertise. However, P5's lack of seminars highlights the need for mandatory professional development to ensure consistent competencies (Gore et al., 2017). Mandated training would foster continuous growth and enhance agricultural teaching effectiveness, ultimately improving student outcomes.

1.5 Specialization. The participants' specializations are diverse but reveal a misalignment with agricultural instruction needs. Only one (P1) specializes in Agribusiness, while others come from Business Technology, Technical Drafting, Administration, Science, and Mathematics backgrounds. Although these fields offer valuable skills, they may lack the technical agricultural knowledge crucial for effective, hands-on teaching.

Table 5. Specialization of the Participants

Participant/s	Specialization
P1	Agriculture
P5	Agribusiness
P2	Business Technology
P3	Technical Drafting
P4, P6	Administration and Supervision
P7	Science
P8	Mathematics

This gap raises concerns about educators' ability to deliver comprehensive Agricultural Crop Production lessons, particularly practical topics like soil management and pest control (Rivera et al., 2019; Osborne et al., 2020). The shortage of specialized instructor limits students' exposure to essential experiential learning, emphasizing the need for targeted professional development and industry partnerships to strengthen teacher competencies (Gore et al., 2017). Addressing these gaps is vital for providing students with quality, industry-relevant agricultural education that meets evolving sector demands.

2. Lived experiences of the participants in the establishment of rural farm school

The lived experiences of teachers in establishing the Rural Farm School (RFS) reflect a journey marked by motivation, systemic challenges, and strong community collaboration. A key motivation was to rekindle students' interest in agriculture, especially those from farming families. Teachers aimed to promote agriculture as a meaningful and respected career, countering the perception that it is a last-resort option. This aligns with experiential learning frameworks that emphasize hands-on activities like gardening and livestock tending to sustain student engagement (Eck et al., 2019; Stripling et al., 2018).

Table 6. Lived Experiences of the Participants in the Establishment of Rural Farm School

Theme	Subtheme
Motivation for Establishment	Engagement and Promotion of Agriculture
	Administrative Decisions
	Personal Challenges and Acceptance
Preparation for Establishment	Documentation and Facilities
	Community and Government Support
Stakeholder Engagement	Identification and Prioritization
	Engagement Methods
Student Enrollment	Criteria and Requirements
	Selection Process

Teachers described a profound motivation to establish the Rural Farm School, driven by a desire to reorient students' perceptions of agriculture and rekindle interest among youth from farming communities. Their narratives highlight how the RFS served not only as a response to the declining value placed on agriculture, but also as a proactive effort to restore dignity and relevance to agricultural learning. This theme reflects how personal advocacy, institutional goals, and community needs converged to shape the school's founding purpose.

The preparation phase was characterized by extensive documentation, logistical planning, and the creation of functional agricultural spaces, all undertaken despite limited institutional guidance. Teachers described this stage as both technically demanding and emotionally taxing, as they navigated new administrative processes while ensuring that facilities met the standards required for agricultural instruction. Their experiences underscore the systemic challenges rural educators face when establishing specialized programs without adequate structural support.

Stakeholder engagement emerged as a cornerstone of the RFS's establishment, with teachers actively mobilizing parents, community members, local government units, and agricultural agencies. Participants emphasized that these partnerships were not merely supportive but essential, enabling the school to access technical expertise, resources, and shared commitment. This theme illustrates how collaborative networks become critical drivers of sustainability in rural educational initiatives.

Teachers recounted the complexities of student enrollment, noting that interest in agriculture was often shaped by family perceptions and broader cultural attitudes toward farming. They navigated these challenges by communicating the value of agricultural education and aligning enrollment practices with the intent of R.A. 10618, which prioritizes students from farming backgrounds. The theme reveals how enrollment processes become both an administrative and cultural negotiation in rural contexts.

Despite this enthusiasm, teachers encountered major challenges, including unclear policies, lack of orientation, and absence of structured curricula. Many operated through trial and error, highlighting the administrative gaps common in rural educational programs (Manalo & Abocejo, 2019). Additionally, the shortage of materials and tools forced teachers to be resourceful, often bringing items from home or relying on community support—underscoring the reality of underfunded rural schools (Bernardo et al., 2021; Lucman & Macud, 2022). Crucially, stakeholder involvement played a pivotal role. Teachers highlighted the support of local government units, co-teachers, and especially the Department of Agriculture, which provided training and resources. These partnerships helped fill critical gaps and fostered a sense of shared ownership, contributing to program sustainability (Esteban et al., 2020).

However, student enrollment remained a challenge. Many families viewed agriculture as a low-status profession, influenced by urban migration trends. Teachers emphasized the need for awareness campaigns to change these mindsets (Cuevas & Atibagos, 2020). In alignment with Republic Act No. 10618, prioritizing students from farming backgrounds proved beneficial, as it helped reinforce pride in farming and connect learning with real-life experiences (Serrano & Dizon, 2019). In sum, the RFS experience demonstrates how dedication, local collaboration, and contextualized learning can overcome systemic barriers and promote agricultural education in underserved areas.

3. Issues and challenges faced by the participants of the rural farm school establishment

The establishment of the Rural Farm School (RFS) surfaced several challenges across administrative, instructional, financial, and manpower domains. Administratively, teachers reported limited familiarity with the program due to insufficient orientation. Participant 1 disclosed difficulty navigating documentation because of vague policies and lack of clear guidance. Similarly, Participant 2 highlighted confusion caused by unclear mandates, while others pointed out the absence of a structured curriculum, which forced them to create lesson materials independently—a concern aligned with Nassaji (2015).

**Table 7. Issues and challenges faced by the participants
of the rural farm school establishment**

Theme	Subtheme
Administrative and Documentation Challenges	Lack of familiarity with the program
	Unclear policies and mandates
	Absence of a structured curriculum
Curriculum and Instructional Challenges	Lack of teaching resources and learning guides
	Exploratory nature of the program
Financial and Resource Constraints	Insufficient budget allocation
	Limited land area for farm activities
Manpower and Workload Concerns	Doubt and resistance from colleagues
	Additional workload and unpaid labor

Teachers consistently described administrative and documentation requirements as one of the most pressing challenges in establishing the Rural Farm School. The lack of proper orientation and unclear policies led to confusion, forcing teachers to interpret mandates independently and navigate bureaucratic processes through trial and error. This administrative ambiguity created delays, increased stress, and heightened the risk of inconsistencies in program implementation—issues commonly noted in rural and newly introduced educational initiatives.

Instructional challenges emerged prominently as teachers grappled with the absence of structured curricula, standardized guides, and clear learning competencies. This lack of direction required them to search for materials, create content from scratch, and improvise teaching strategies, which often resulted in uneven instructional quality. The exploratory nature of the program further compounded confusion, leaving teachers uncertain about expected student outputs and pedagogical pathways.

Financial limitations significantly hindered the effective operation of the RFS, as teachers reported little to no budget for essential tools, materials, and farm inputs. These constraints forced them to rely on personal funds or makeshift resources, compromising the scope and quality of agricultural activities. Limited land availability further restricted hands-on learning opportunities; a challenge consistent with broader rural resource disparities documented in agricultural education literature.

Manpower issues were intensified by skepticism and resistance from colleagues who questioned the feasibility and value of the program. Teachers also experienced a substantial increase in workload, often performing additional tasks—including weekend duties—without compensation. These conditions reflect a pattern of unpaid labor and role overload among Filipino teachers, heightening burnout risk and threatening long-term sustainability of the RFS initiative.

Instructionally, the lack of standardized learning guides and MELCs placed additional burden on teachers. Participants 3 and 4 emphasized that they had to search for content and improvise lessons, leading to inconsistencies in delivery. The exploratory nature of the program also caused confusion about expected outputs, echoing Cabansag's (2014) view that poor resource availability leads to improvisation, and Ornstein and Hunkins' (2017) critique of vague curricula.

Financial constraints further hindered implementation. Teachers cited inadequate funding for tools and materials, with Participants 2, 7, and 8 stating they received no financial support. Participant 5 added that limited land area made it difficult to conduct farming activities, echoing concerns raised by Gruenewald and Smith (2014) and supported by Maligalig and Albert (2018) regarding rural resource disparities.

Lastly, manpower and workload concerns were raised. Participant 6 mentioned skepticism from colleagues and having to work weekends without pay. This reflects PIDS (2019) findings on teacher resistance and Cerebro's (2024) report on excessive unpaid work among Filipino educators.

4. Intervention material in establishing rural farm schools as part of Agricultural Crop Production instruction

This Teacher's Guide was specifically crafted for Rural Farm Schools, which faced unique challenges and opportunities. The guide served as a practical, adaptable, and supportive tool. It offered low-cost and localized activities, and strategies that simplified lesson delivery while actively engaging students. Moreover, it fostered partnerships between schools and local farming communities, helping to bridge the gap between classroom learning and real-world agricultural practice. The guide also emphasized presenting agriculture as a dignified, innovative field—equipping students with essential life skills, values, and a deep respect for the land.

CONCLUSIONS

In the light of the foregoing findings, the following conclusions were drawn:

1. Teachers who taught Agricultural Crop Production were mostly Master's degree holders with extensive teaching experience, but they generally lacked practical agricultural work experience and had varied levels of seminar participation, with specializations often not directly related to agriculture.
2. The lived experiences of teachers teaching Agricultural Crop Production highlighted a strong motivation to engage students in agriculture despite facing challenges such as unclear guidelines, insufficient resources, and community perceptions of agriculture as a low-status career.
3. Key challenges experienced by teachers teaching Agricultural Crop Production included administrative burdens, curriculum inconsistencies, financial constraints, and heavy workloads.
4. Intervention material for Agricultural Crop Production was crafted as an intervention strategy to fortify the establishment of rural farm schools.

RECOMMENDATIONS

Based on the foregoing findings and conclusions, the following were recommended:

1. The crafted intervention material may be presented to subject group heads and master teachers for review to validate its effectiveness and viability in ACP teaching in rural farm schools in Cavite.
2. ACP teachers can attend seminars and hands-on agricultural training for retooling and upskilling, while the completion of an advanced degree in agricultural education is also recommended to bridge the gap between theoretical knowledge and practical application.
3. Stakeholders, including school administrators and policymakers, may consider providing ACP teachers with clear guidelines, improved resources, and additional support to help reduce workload and enhance agricultural education.
4. A similar study may be conducted to explore the effectiveness of these interventions and identify additional strategies to support teachers and improve agricultural education in rural areas.

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COLLABS COLLAPSE: COLLABORATION PROBLEMS OF SENIOR HIGH SCHOOL STUDENTS IN WRITING RESEARCH

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ABSTRACT

Collaboration in research writing is an essential academic skill that fosters teamwork, critical thinking, and communication. However, challenges such as unequal task distribution, passive participation, and resource limitations hinder students' productivity and research quality. While previous studies have explored the benefits of collaborative learning, limited research has focused on the specific challenges encountered by senior high school students in research collaboration. This study aims to examine the problems experienced by senior high school students in a private university in Camarines Sur when engaging in collaborative research writing. The study investigated students' perspectives, identified barriers to effective group work, and explored strategies for improvement. A qualitative research design was employed, and data were collected through semi-structured interviews with 30 senior high school students. Thematic analysis was used to identify key patterns in their responses. Findings suggest that while students recognize the benefits of collaboration, such as idea exchange and workload distribution, challenges persist. Unequal participation, time constraints, and conflicts in writing styles were common issues reported. Students also highlighted the role of teachers in facilitating collaboration, providing guidance, and resolving conflicts. Strategies such as assigning clear roles, implementing peer evaluations, and utilizing digital collaboration tools that emerged as potential solutions. The findings of this study contribute to a deeper understanding of the obstacles in collaborative research writing among senior high school students. The results emphasize the need for structured interventions, including teacher-mediated strategies and institutional support, to enhance collaborative learning. Addressing these challenges can lead to improved research efficiency, better teamwork skills, and a more positive academic experience.

Keywords: collaborative research writing, senior high school students, teamwork challenges, research collaboration, collaborative writing

INTRODUCTION

Collaborative learning and research prepare students for real-world challenges by enhancing critical thinking, communication, and teamwork skills (Cahulugan et al., 2024). However, obstacles such as inadequate collaborative skills, unequal task distribution, and resource limitations hinder their research productivity (Mishore & Abate, 2023; Le et al., 2017). These challenges can affect the quality of outputs and students' overall academic experience, highlighting the need for strategic interventions. Furthermore, focusing on improving collaborative practices addresses educational gaps and aligns with the 21st-century skills framework, which emphasizes collaboration and problem-solving (Cahulugan et al., 2024). Over the years, various studies on collaboration within the classroom have been conducted. These include research on collaboration to enhance critical-thinking skills (Viado & Espiritu, 2023), the research writing and collaborative skills of senior high school students (Patricio, 2022), the uses, benefits, and challenges of collaborative learning (Padilla, 2021), EFL teachers' perspectives on collaborative learning activities in the senior high school context (Wijaya, 2021), the effectiveness of collaborative writing among secondary school students in ESL classrooms (Veramuthu & Shah, 2020), attitude changes among students in collaborative writing (Chen & Yu, 2019), the types of research collaboration and

productivity (Abramo et al., 2017), and the analysis of students' collaboration patterns and problem-solving strategies (Chang et al., 2017).

These studies examine how collaboration impacts high school students' research writing, attitudes, and relationships, showing that collaborative learning enhances writing abilities, critical thinking, and engagement. However, most studies primarily focus on teachers' perspectives, examining collaboration as a pedagogical tool rather than investigating the direct challenges students face in research collaboration (Talib & Cheung 2017). While some research highlights students' experiences, there is still a lack of focus on the specific collaboration difficulties they encounter during the research process. This study addresses this gap by examining the collaboration problems of senior high school students, particularly in research, to provide insights that can improve collaborative learning strategies. This study aims to verify the benefits and challenges encountered by senior high school students.

Literature Review

Benefits of Collaboration in Writing

Collaboration in writing plays a crucial role in academic development, fostering both linguistic and interpersonal skills while preparing students for real-world teamwork. Research indicates that collaborative writing enhances cognitive engagement, improves language proficiency, and strengthens peer relationships (Padilla, 2021; Talib & Cheung, 2017). Moreover, this process develops essential 21st-century skills such as critical thinking, problem-solving, and adaptability (Chen & Yu, 2019). With advancements in technology, collaborative platforms further facilitate efficient communication and shared authorship, leading to more productive and meaningful learning experiences (Talib & Cheung, 2017).

Language Benefits

Collaborative writing significantly enhances students' linguistic competence by engaging them in meaningful discussions about language use, structure, and coherence. Through peer interaction, students receive immediate feedback, refine grammatical accuracy, and develop their writing fluency (Talib & Cheung, 2017). Research further shows that students participating in collaborative writing activities produce higher-quality texts due to increased awareness of writing conventions and content organization (Chen & Yu, 2019). Collaborative writing frameworks, when structured efficiently, have been shown to significantly improve students' writing fluency and confidence, particularly in second language settings (Pham, 2021). Additionally, collaborative writing encourages metalinguistic reflection, allowing learners to analyze and negotiate language choices actively. This process not only improves students' writing skills but also fosters critical thinking, reinforcing their ability to construct well-organized and coherent academic texts (Padilla, 2021).

Interpersonal Benefits

Beyond language development, collaborative writing nurtures interpersonal skills by fostering teamwork, communication, and mutual respect among students. Studies indicate that students who engage in collaborative writing develop stronger relationships with peers, leading to increased motivation and positive learning experiences (Chen & Yu, 2019). This approach also cultivates a sense of shared responsibility as students learn to value diverse perspectives and support each other in overcoming writing challenges (Padilla, 2021). Moreover, collaborative writing builds students' confidence by allowing them to contribute their ideas while learning from their peers' insights. In addition to developing technical writing skills, collaborative strategies also stimulate student creativity and originality in written output (Soraya, 2016). These social benefits are essential in both academic and professional settings, where teamwork and effective communication are critical for success (Talib & Cheung, 2017).

21st-Century Skills

In the modern educational landscape, collaborative writing equips students with essential 21st-century skills, preparing them for dynamic and technology-driven environments. Research emphasizes that collaboration fosters problem-solving abilities, adaptability, and digital literacy through the integration of online tools such as Google Docs and discussion forums (Talib & Cheung, 2017). Furthermore, collaborative learning environments encourage students to engage in higher-order thinking, promoting creativity and analytical reasoning (Chen & Yu, 2019). As students navigate group dynamics, they also

develop leadership and project management skills, essential for future academic and professional endeavors. By integrating technology and teamwork, collaborative writing enhances students' ability to thrive in an increasingly interconnected and complex world (Padilla, 2021).

Challenges in Collaborative Practices

Student-related challenges significantly impact the effectiveness of collaborative research among senior high school students. Passive participation remains a major concern, with some students relying on peers to complete tasks, leading to an imbalance in contribution and engagement (Chen & Yu, 2019). Negative attitudes toward collaboration further hinder productivity, as students who struggle with teamwork may disengage, reducing opportunities for meaningful discussions and learning (Chen & Yu, 2019). Additionally, difficulties in communication and conflict resolution often arise, making it challenging to establish a cohesive working dynamic. Without proper guidance, these issues can limit the overall success of research collaboration. Moreover, affective factors such as emotional engagement, stress, and perceived group support also play a critical role in determining the success of collaboration, particularly in high school learning environments (Pietarinen et al., 2018).

Teacher-related challenges also affect the facilitation of collaborative research. Educators often struggle to address unequal participation and ensure that all group members contribute effectively (Padilla, 2021). Monitoring multiple groups, providing timely feedback, and guiding students through research processes require significant effort, which can be overwhelming, especially in large classes. Teachers may also face difficulties in equipping students with the necessary skills for collaboration, such as critical thinking, problem-solving, and academic writing. Without adequate training and support, teachers may find it challenging to implement structured and effective collaborative learning strategies, reducing the overall efficiency of the research process.

Resource-related challenges further hinder the effectiveness of collaborative research. Limited access to technology and research materials prevents students from efficiently gathering and analyzing data (Talib & Cheung, 2017). Schools often struggle to provide updated digital tools and learning materials essential for 21st-century research skills (Cahulugan et al., 2024). Mishore and Abate (2023) also observed that students face difficulties in data analysis and tool selection due to resource limitations, compromising the quality of their work. These constraints not only limit research opportunities but also discourage active participation. Addressing these gaps requires investment in infrastructure and training to enhance collaborative learning outcomes.

Recommendations for Enhancing Collaborative Writing

To maximize the benefits of collaborative writing, educators should implement structured strategies that encourage equal participation and enhance peer interaction. Assigning specific roles within groups, such as reviewer, editor, and content developer, can prevent passive participation and ensure balanced contributions (Chen & Yu, 2019). Teachers should also provide explicit training in collaborative writing techniques, equipping students with the skills needed to communicate effectively and resolve conflicts productively (Padilla, 2021). Additionally, integrating technology, such as Google Docs or collaborative wikis, can streamline the writing process, allowing for real-time feedback and shared authorship (Talib & Cheung, 2017). Regular peer assessments and self-reflections can further enhance accountability and engagement, reinforcing students' active involvement in the writing process. Finally, incorporating diverse writing tasks that cater to varying proficiency levels ensures that all students, including lower-proficiency learners, benefit from collaboration while fostering linguistic and cognitive growth (Chen & Yu, 2019).

Addressing Gaps in Collaborative Research Writing

Effective collaboration has always been a challenge among students. While research on collaborative writing often focuses on higher education or professional teams, senior high school students remain underexplored despite their critical stage of skill development. Emotional and motivational factors, key to collaboration success, are often overlooked in these contexts (Koivuniemi et al., 2018). Unlike merely assigning group work, true collaboration requires structured guidance, clear objectives, and defined roles to ensure equitable participation and minimize stress. Studies suggest that collaboration dynamics vary greatly across fields and contexts, highlighting the need for targeted strategies (Katz & Martin, 1997; Bozeman et al., 2013; Bozeman & Boardman, 2013). Addressing both cognitive and emotional aspects is

crucial, particularly for secondary students navigating collaborative research writing (Viado & Espiritu, 2023). Therefore, there is a need to provide senior high school students with strategies for working together when writing research.

STATEMENT OF THE PROBLEM

In a collaborative learning context, there are several studies regarding senior high school students writing research. However, despite the increasing amount of research on collaboration and its contribution to learning, the field still lacks an understanding of why and when groups engage in successful collaboration and why they sometimes fail (Barron, 2003; Miyake & Kirschner, 2014). Hence, this study aims to address the following two research questions:
1. What are the views of senior high school students toward collaborative research writing?
2. What are the challenges and benefits of pursuing collaborative research writing?

METHODOLOGY

Research Design
The research utilized a qualitative design to explore the collaboration problems experienced by senior high school students in conducting research. This design aligns with the study's objective of providing an in-depth understanding of students' perceptions, challenges, and benefits associated with collaborative research writing. By employing a descriptive approach, the study systematically captured and analyzed the specific issues and dynamics that influence the effectiveness of group work in an academic setting. This research focuses on identifying and addressing the nuanced factors that affect collaboration, such as unequal task distribution, passive participation, and resource limitations. These themes highlight the need to explore the "what" and "how" of collaboration problems.

Research Locale and Participants
The study involved thirty senior high school students currently enrolled at a private senior high school. After seeking permission from the principal, participating students were selected using convenience sampling. The researchers sought guidance from a research teacher whose grade 12 classes had already completed their research projects, after the three semesters dedicated for the subject. While several students signed up for an interview, only 30 respondents were selected through a randomizer to support fairness and representation of different group experiences.

Data Gathering
The data was collected using semi-structured interviews. Permissions were obtained from the principal and proceeded with the invitations for interviews through the research teacher of the students. Volunteer participants completed an informed consent form. During the interview, sessions were audio-recorded with the participant's permission. The recordings were transcribed to ensure the accuracy and clarity of the data. Furthermore, the transcriptions were reviewed and corrected by the participants to ensure accuracy. In collecting data for this descriptive qualitative study on collaboration problems experienced by senior high school students, strict ethical principles were adhered to.

Data Analysis
In this study, thematic analysis was employed as a method of analyzing qualitative data (Braun & Clarke, 2006) to provide an understanding of the challenges and benefits experienced by senior high school students and their perspectives toward collaborative research writing.

FINDINGS

This study examined the problems experienced by senior high school students in a private university when doing collaborative research writing. The results of the interviews of 30 students reveal students' perceptions, encountered obstacles, and the strategies they employed. The following sections examine

these themes in detail, offering insights that inform both classroom practice and future research directions. Table 1 summarizes the themes and codes of student responses on their views toward collaborative writing.

Table 1. Students' views toward collaborative research writing

Respondent	Narrative (Sample Quotes)	Code (Frequency)	Theme
Xian	Communication… para mas mapadali talaga ang gawa… before yung collaboration, you communicate" [Communication… makes the work easier… before you collaborate, you communicate.]	Communication (15)	Student Skills
Sophia	Madali po nako maka adapt… hindi po ako nahihirapan ["I adapt easily… I am not struggling.]	Adaptability (14)	
Andrei	May mga skills po ako na tigdi develop… like critical thinking… since yun ay kailangan sa research. English Translation: [I have skills that I need to develop… like critical thinking… since that is needed in research.]	Critical Thinking (17)	
Anne	Iindividually po nila sine send sa akin… hindi po sila nakikicooperate… medyo nagiging sabog po sya. [When they send [tasks] to me individuall and they do not cooperate… that makes the work look messy and unorganized.]	Cooperative (12)	Desired Qualities in Members
Janine	I asked them to write more critically, because when they do their part, when they write their parts critically, revisions are lesson, because, for example, if I give them this task and they already write it in a manner that is already um in a manner that they were critical during writing, so mistakes po, or revisions will be lessened.	Skilled Writer (7)	
Sophia	Madali rin po maka adapt and maging open minded sa mga ideas [I must easily adapt and be open-minded to ideas.]	Open minded (6)	
Roy	[The teacher] helped us by providing comprehensive guidance and implementing weekly meetings with all group leaders and members to monitor progress.	Teacher Guidance (15)	Teacher's Role
Val	My teacher helped in solving the problems by instructing us and giving us solutions… and when his instruction did not work, he would give us another.	Problem Solver (6)	
William	[The teacher] also checks up on our group's progress… to ensure that all of our members are really helping or not."	Monitoring Progress (5)	
Roy	Collaborative research has influenced my growth by improving my ability to work with others and enhancing my critical thinking skills.	Improved communication (13)	Impact on Individual's Growth
Ralph	Pinalabas niya ako sa comfort zone talaga… dahil collaborative, na work upon ko yung social skills ko. [I recognize it really brought me out of my comfort zone… because it was collaborative, I was able to work on my social skills.]	Increased Self-awareness (11)	
AJ	It made me realize that I have to be more responsible and [doing so] actually helped me communicate with my teammates."	Greater Sense of Responsibility (11)	

Personal Skills Contributing to Group Success

This theme captures the identified skills identified by students as most essential for effective collaboration during research writing: communication, adaptability, and critical thinking. Students emphasized that communication ensures task coordination and clarity. Communication is definitely viewed as a top skill in collaborative research writing. Students like respondent Xian pointed out the need for having dialogues with his groupmates to jumpstart their research project. Inarguably, this skill is mentioned in several studies to achieve collaborative success (Behar-Horenstein & Prikhidko, 2017; Kelly et al., 2020; Sturner et al., 2017). Sturner et al. (2017) characterize effective communication by conducting initial planning and giving updates whether in-person or remotely. Conversely, the lack of communication negatively affects working relationships (Behar-Horenstein & Prikhidko, 2017). Adaptability in such dynamic environments must also be developed (Edmondson & Harvey, 2025) for the students to assume different roles, take on responsibilities, and overcome group differences. In the case of Sopia, she views open-mindedness as a key to achieving adaptability, especially when handling different group tasks. Moreover, the cognitive demands of collaborative writing also develop other skills like critical thinking as what Andrei noted in his growth throughout the whole process. These findings reflect the conclusions of Padilla (2021) and Talib and Cheung (2017), stressing how strong interpersonal and cognitive skills are central to successful group work. The students' responses affirm that communication, adaptability,

and critical thinking are not only vital to collaboration but also integral to academic growth and research quality.

Desired Qualities in Research Group Members

The qualities students look for in ideal group members during research collaboration include cooperation, writing proficiency, and open-mindedness. Students viewed cooperative peers as essential for maintaining group unity and completing tasks efficiently. This view is shared by Sturner et al. (2017), who found that cooperation facilitates undergraduate research groups' function effectively. Based on respondent Anne's observations, lack of cooperation results in group disorganization, especially in their written output. Detweiler-Bedell and Detweiler-Bedell (2019) described collaborative writing in different iterative phases, which include individual writing, group editing, brainstorming ideas, and team discussions. Consequently, writing skills are equally valued by participants as another critical skill, as clear and grammatically sound output enhances research quality. For example, participant Janine highlighted the importance of critical writing skills in facilitating revisions. McGinn and Niemczyk (2020) caution that equitable contribution, particularly in academic writing requirements, will always be a challenge and may create conflicts and unsuccessful projects. Behar-Horenstein and Prikhidko (2017) underscored the importance of writing in collaborative research tasks as it serves as a metric of scholarly success. However, to pacify problems rooted in uncooperativeness, such as freeriding, open-mindedness was emphasized as a vehicle of facilitating idea exchange and preventing conflicts, as explained by respondent Sophia, who preferred flexible, respectful contributors. Fareed et al. (2016) highlighted that openness to others' ideas enhances group harmony and task success, aligning with the students' desire for open-minded and skilled group members.

Teachers' Role in Addressing Group Challenges

Teachers also play a significant role, especially when challenges arise. Certain needs include teacher guidance, problem-solving support, and progress monitoring. Students, like participant Roy, noted that clear instructions and structured oversight were vital in managing group dynamics and task completion, underscoring the impact of consistent teacher engagement. This finding aligns with Padilla (2021), McGinn and Niemcyzk (2020), and Detweiler-Bedell and Detweiler-Bedell (2019), whose studies on collaborative research advocate that teacher involvement is crucial in balancing group responsibilities and addressing conflicts. Beyond guidance, teachers actively intervened to resolve group issues, indicating flexibility and responsiveness in instructional support, as gleaned from the issues described by respondent Val. Bergmark et al. (2024) described this teacher's demonstration as a relational role to ensure good working climate within the group.

Monitoring also played a preventive role in avoiding conflicts and ensure progress, as noted by respondent William. These interventions reflect the importance of active facilitation in collaborative learning environments, fostering more equitable participation and enhancing group productivity. Sturner et al. (2017) emphasized that students seek active guidance and moral support from teachers as they manage through their collaboration issues that include conflict management, task distributions, and clashing of personalities. For Zou et al. (2023), the monitoring transforms to mentoring when the teacher helps build a sense of community among group members. Additionally, their study stressed that, while productive collaboration results in a significant research experience, the freeriding issues of uncooperative members describe a frustrating research encounter for the productive ones.

Impact of Collaboration on Personal and Academic Growth

Students also recognize the impact of collaborative research writing on students' personal and academic growth. The most frequent outcomes include improved communication, increased self-awareness, and a greater sense of responsibility. Students, like Roy, acknowledged that group work helped them express themselves clearly and recognize their individual contributions. Likewise, respondent Ralph shared how their research journey brought him out of his comfort zone, improving his social skills. Zou et al. (2023) reported these skills, as well as other transferable soft skills that students develop while conducting undergraduate research, will be crucial in future endeavors. AJ also reflected on the accountability of his work and to his groupmates. These outcomes affirm the findings of Zhang (2020) and Padilla (2021), who emphasized that collaboration develops both academic and affective domains. The responses suggest that collaborative writing enhances not only technical skills, such as writing and analysis, but

also maturity, adaptability, and confidence. This holistic development reflects the transformative potential of group research tasks in preparing students for complex academic and real-world settings.

While the views towards collaborative writing generally are positive, certain challenges cannot be avoid as the interviews revealed. Conversely, benefits are more elaborated. Table 2 outlines the themes and codes gleaned from student responses regarding the challenges and benefits of collaborative research writing.

Table 2. Challenges and Benefits of Collaborative Writing

Respondent	Narrative (Sample Quotes)	Code	Formulated Theme
Roy	…One problem that may occur is having an unequal distribution of workload. Since other members might do more than the other.	Unequal participation (14)	Challenges
Belmond	Some people have different standards than others… so if the work does not meet their standards, it might lead to arguments or conflicts.	Varying knowledge and skills (11)	
Princess	Miscommunication leads to confusion… Sometimes if [instructions] are unclear, task may be misunderstood or overlooked.	Miscommunication (9)	
Ralph	We are very different people tas ang ideologies naming tas mga preference namin didiffer talaga. [We are very different people and our ideologies and preferences truly differ, so we might not initially understand one another.]	Personality and perspective clashes (9)	Causes
Zach	Everybody has different ideas and they interpret things differentl, so problems like communication can lead to misunderstanding.	Poor communication skills (8)	
Janine	Not all members are willing to openly communicate… We have different strengths, different skillset, and we have different commitments in our personal lives and academic lives.	Differences in the level of motivation, interest, and commitment (6)	
Ryles	You can increase the productivity time and the more productive the group is, the more you will do the task early as possible.	Time efficiency (13)	Benefits of Collaboration
William	Being in a group is a more reliable and more efficient way to finish the research writings.	Shared workload (12)	
Belmond	…if you collaborate with other researchers or other students who are doing the same research, you might get different ideas, different perspectives, and extra hands…	Diverse perspectives (9)	
Joshua	"proper communication… kapag hindi mo to kayang gawin, sabihin mo sa groupmates…" [Proper communication… if you cannot do it, tell your groupmates, so they can assign other people to help you with the task.]	Open communication (13)	Solutions Applied
Roy	Our leader clearly disseminated the tasks to each member so that the research can be more polished and perfect.	Task delegation (7)	
Janine	tried to give them guides or guidelines as much as possible.	Peer guidance (5)	
Val	When there is a mistake, the group… will effectively solve it.	Effective teamwork (13)	Effectiveness of Collaboration
AJ	Groupings are more effective because of the knowledge and feedback gained from others as compared to doing things alone.	Productive learning (10)	
Julio	You can't really do tasks alone…you need certain groupmates that are good in their own way to complete their tasks.	Balanced tasks (9)	

Common Challenges in Collaborative Writing

Common challenges identified include unequal participation, varying knowledge and skills, and miscommunication during collaborative research writing. These issues often result in an uneven division of tasks, where more capable students complete the majority of the work. The occurrence of unequal participation described by student Roy stems from unequal distribution of tasks, similar to the finding of Janssen and Wubbels (2017) that students who are unskilled in collaboration resort to non-contribution to the tasks assigned to them. For McGinn and Niemcyzk (2020), some students might not be contributing significantly because of their writing capacities, reflecting the response of student Belmond. Det-

weiler-Bedell and Detweiler-Bedell (2019) explain that developing academic writing skills takes time. In the participants' context, where students recognize that their writing skills vary, consolidated outputs require reviews and often revisions. Veramuthu and Sha (2020) noted that disparities in skills often lead to passivity, where less confident students disengage due to feelings of inadequacy, resulting in unresponsiveness and contributing to other problems, like miscommunication. Miscommunication further complicates coordination and causes tension among members, as respondent Princess emphasized. Le (2018) noted that the lack of interpersonal and teamwork skills hinders collaborative learning and weakens group cohesion. This observation is consistent with Sturner et al.'s finding (2017) that communication is the most frequent challenge in collaborative research tasks. These recurring problems suggest a need for clearer task structuring, equitable role assignment, and improved group communication.

Root Causes of Collaboration Issues

The top three root causes senior high school students face are personality and perspective clashes, poor communication skills, and differences in level of motivation, interest, and commitment. Student-participant Ralph mentioned that some clashes are rooted in individual differences that stem from personality, commitment, and communication. Working relationships may be affected by diversity and communication differences, which must be consciously addressed (Behar-Horenstein & Prikhidko, 2017). In relation to the poor communication that respondent Zach described, these may be attributed to the different levels of motivation, interest, and commitment, which Behar-Horenstein and Prikhidko explained may be related to the personal relevance of the research to each member of the group. It is possible that when group members do not feel as passionate about their topic as other members (e.g., leaders), they show less effort in their tasks. In addition, Veramuthu and Shar (2020) highlight a similar point: although collaborative writing is a good opportunity for their ideas to be merged for a better outcome, peer assistance is ineffective and unnecessary, especially for those who do not see it as valuable. Moreover, it then shows how teamwork, no matter how important a role it plays, presents difficulties for students, as they struggle to work with members they are unfamiliar with; whereas the quality of work is much higher when collaborating with friends than when working with less familiar or less close members (Talib & Cheung, 2017).

Benefits of Collaborative Research Writing

Despite the challenges, students regard collaborative research writing as particularly beneficial in terms of time efficiency, shared workload, and exposure to diverse perspectives. Participants, such as Ryles, stated that distributing tasks enables quicker completion and minimizes individual strain. Sturner et al. (2017) share a similar finding that group work benefits include the faster completion of complex tasks, compared to doing tasks individually. Conversely, the workload becomes relatively lighter, as experienced by respondent William. Such division of labor often facilitates and expedites the research work (McGinn & Niemczyk, 2020). Effective distribution of tasks is fostered when, despite the emergent skills still being developed, members' strengths complement each other's weaknesses. These findings are consistent with Abramo et al. (2017), who emphasized the value of complementary skills and efficient time use in collaborative research. In support, Bozeman et al. (2015) highlighted that collaboration fosters essential competencies such as accountability and adaptability. Talib and Cheung (2017) emphasized that collaborative writing enhances peer communication and encourages shared authorship, aligning with students' noted improvements in interpersonal skills. Similarly, Padilla (2021) found that collaboration boosts writing fluency and confidence through peer feedback and interaction, supporting the students' experiences of improved expression and idea development. A notably uncommon yet meaningful response identified work experience preparation as a benefit. Overall, respondent Belmond emphasized collaboration's relevance to future professional pursuits—a view shared by several studies reporting that research skills development helps students prepare for advanced careers and further education (Davis et al., 2015; Ruth et al., 2025).

Student-Initiated Solutions to Collaborative Problems

To resolve issues, students employed several strategies to address collaboration issues, with open communication, task delegation, and peer guidance emerging as the most frequently mentioned approaches. These practices aimed to minimize misunderstandings and promote equitable participation among group members. Joshua, a respondent, admonished the importance of transparent dialogue. Ac-

cording to Bergmark et al. (2024), open dialogue and communication, which especially involves the mentor, is crucial in understanding differing perspectives, leading to better task delegations. Roy emphasized the value of task delegation by leaders. In addition to communication and clear task assignment, students also guided one another to ensure the quality of group output. Detweiler-Bedell and Detweiler-Bedell (2019) recommend that acknowledging previous experiences and growing research expertise of leaders can positively impact research completion. To complement such leadership, peer guidance is vital, as demonstrated by respondent Janine, who provided clear guidelines for their tasks. These findings reinforce Talib and Cheung's (2017) view that communication and social skills are central to teamwork, while Padilla (2021) affirms the need for structure in collaborative writing. Notably, coercion also appeared as a rare yet revealing response, indicating that pressure was sometimes used in place of authentic cooperation. Bergmark et al. (2024) recognize that this authoritarian leadership might not be effective.

Effectiveness of Collaborative Research Writing

Overall, students find that collaborative writing facilitates their workload. Effective teamwork, productive learning, and balanced tasks were the most commonly cited outcomes. Student Val noted that improving teamwork is challenged in decision-making and feedback. Similarly, respondent AJ recognized the role of feedback in their productivity. Ruth et al. (2025) advocate that two-way feedback mechanisms indicate key social skills gained through teamwork. Some respondents acknowledged that they have improved their skills as they learn from their peers and from the research process, such as participant Julio, who also acknowledged that things cannot be done alone; hence, certain groupmates' skillsets help to balance the shortcomings. These insights support Veramuthu and Shah's (2020) findings that collaborative writing enhances both motivation and language accuracy. Zhang (2020) likewise observed that students perceived collaborative continuation tasks as beneficial to grammar, vocabulary, and creativity. Although some students believed that outcomes depended on group dynamics, the majority viewed collaborative writing as an effective strategy that fosters comprehension, shared responsibility, and linguistic growth.

CONCLUSIONS

The purpose of this study was to examine the collaboration problems experienced by senior high school students in conducting research writing. Specifically, it aimed to explore their perspectives, identify the challenges they encountered, and analyze the strategies they applied to overcome these difficulties. The study found that collaborative research writing enhances students' academic productivity, primarily through time efficiency, shared workload, and exposure to diverse perspectives. These benefits enabled students to complete research tasks more effectively while engaging with diverse viewpoints that enriched the content.

Despite these advantages, students encountered recurring challenges that impeded collaboration. These issues often stemmed from differences in personality, limited communication abilities, and inconsistent motivation among group members. In response, students employed practical strategies, such as open communication, task delegation, and peer guidance, allowing them to manage group dynamics and improve their collective output. Teachers were also found to be instrumental in supporting collaborative success. Their roles extended beyond instruction to include conflict resolution, regular monitoring, and offering flexible solutions. These findings affirm that both academic competencies and interpersonal qualities are essential to group cohesion and the successful completion of research writing tasks.

Additionally, the experience of collaborative writing led to meaningful personal and academic growth among students. They reported increased confidence, a deeper sense of responsibility, and improved communication and critical thinking skills. Moreover, students viewed collaboration as an effective learning method that enhanced their understanding of research processes, encouraged peer support, and strengthened task management. Collaboration serves as preparation for real-world work is an emergent finding that underscores its broader educational value, fostering essential skills such as adaptability, coordination, and accountability that are vital beyond the classroom.

RECOMMENDATIONS

To enhance the effectiveness of collaborative research writing, educators should implement structured group strategies that promote equal participation and accountability. Detweiler-Bedell and Detweiler-Bedell (2019) recommend establishing formal structures and roles in the groups to have a successful research project. This recommendation can be realized through designating co-leadership of two experienced members to lead the group, scheduling frequent consultation sessions, and devoting time to address group dynamic concerns. These suggestions align with Chen and Yu (2019), who emphasized the value of assigning specific roles to prevent passivity. Without teacher-directed scaffolding, students may struggle with the task, as most of them may be novice researchers in research writing. Teachers must also provide instruction on communication, time management, and conflict resolution, as supported by Padilla (2021), who found that training in these areas fosters group efficiency. Essentially, a teacher's hands-on monitoring, not only of the deliverables but also of the dynamics of the collaborative writing tasks, can address and resolve confusions and conflicts that might also affect students' interaction outside the subject. Regular monitoring and peer assessments, as highlighted by Veramuthu and Shah (2020), can improve engagement and accountability. Lastly, to optimize collaboration, the use of digital collaborative tools like Google Docs and video-conferencing platforms is recommended, as suggested by Talib and Cheung (2017), can assist cooperation and communication problems. Consequently, institutional support through access to technology and inclusive policies ensures a productive collaborative environment, echoing Cahulugan et al.'s (2024) call for 21st-century skills integration, especially in research settings.

Limitations and Suggestions for Future Research

This study was limited to senior high school students of one private school only, thus restricting the extent to which the findings can be applied to other student populations. Future studies may compare collaborative research writing across different academic levels, subject areas, and school settings to determine contextual variations. Quantitative or mixed-method approaches could also provide broader insights into how demographic factors influence collaboration. Investigating the long-term impact of collaboration on students' academic and professional development is likewise recommended. This study concludes that collaborative research writing fosters academic productivity, personal growth, and essential 21st-century skills. While challenges such as unequal participation and miscommunication persist, they are mitigated through structured strategies, teacher support, and student-initiated solutions. Effective collaboration depends on fostering both academic competencies and strong interpersonal dynamics within student groups.

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