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Development and Evaluation of a Video-Based Supplementary Learning Material on Organic Mix Feed for Ducks and Its Effects on Grade 9 Students' Content Knowledge

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ABSTRACT

This study developed, implemented, and evaluated a video-based supplementary learning material on organic mix feed for ducks among Grade 9 students at Hinunangan National High School. Guided by the ADDIE instructional design model, it aimed to identify learning gaps, develop a contextualized multimedia resource, determine its effectiveness in improving content knowledge, and assess its acceptability. A quasi-experimental one-group pretest–posttest design was employed involving 51 students. Data were gathered using researcher-developed achievement tests and a student perception questionnaire and analyzed using descriptive and inferential statistics. Results revealed that 45.1% of students were classified under the "Needs Improvement" level, indicating limited prior knowledge in ingredient identification, nutritional understanding, and feed preparation procedures. Following the intervention, the mean score increased from 13.43 to 23.08, yielding a 71.85% gain. A paired-samples t-test showed a statistically significant difference between pretest and posttest scores $t(50) = -11.72$, $p < .001$), while a large effect size ($d = 1.64$) indicated strong instructional impact. The weak correlation between pretest and posttest scores ($r = .234$, $p = .099$) suggests that learning gains were not dependent on prior achievement. Students also rated the instructional material as highly acceptable in terms of clarity, relevance, engagement, usability, and learning effectiveness. The findings indicate that the video-based instructional material significantly improved students' content knowledge and was positively received. This study demonstrates the effectiveness of contextualized multimedia instruction in enhancing conceptual understanding and procedural skills in agricultural education and supports its integration into Technology and Livelihood Education instruction.

Keywords: *video-based learning, supplementary instructional material, organic mix feed, ADDIE model, agricultural education, Grade 9 students, content knowledge*

INTRODUCTION

The integration of multimedia resources has reshaped contemporary education, with video-based instructional materials increasingly recognized for their capacity to enhance comprehension, retention, and learner engagement through the simultaneous integration of visual and auditory channels (Mayer, 2021; UNESCO, 2023). In technical and vocational education, particularly Agriculture under the Technology and Livelihood Education

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(TLE) curriculum, video-based instruction is especially valuable for supporting the development of procedural and hands-on competencies that are difficult to convey through conventional text-based approaches.

Despite these advantages, agricultural education continues to face persistent instructional constraints, particularly in resource-limited and rural contexts. Learners often experience difficulty in understanding abstract and procedural agricultural concepts due to limited access to contextualized and visually rich learning materials (OECD, 2020; FAO, 2022). Such limitations weaken the transfer of classroom knowledge into authentic agricultural practice, thereby constraining both conceptual understanding and skill acquisition.

A key instructional area in agriculture is the preparation of organic mix feed for poultry, which promotes sustainable and cost-effective livestock production. This process utilizes locally available materials such as water lettuce (*Pistia stratiotes*), madre de agua (*Trichanthera gigantea*), rice bran, golden apple snail (*Pomacea canaliculata*), and molasses due to their accessibility and nutritional value (Heuzé et al., 2017; Ruan et al., 2015; Setiadi et al., 2020; Fatmawati et al., 2021; Waldroup, 2007). However, learners commonly encounter difficulties in identifying these ingredients, understanding their nutritional roles, and performing accurate feed preparation procedures, indicating the need for more effective instructional interventions.

At Hinunangan National High School, Grade 9 learners exhibit similar challenges in organic feed preparation, largely attributed to the absence of contextualized video-based instructional materials. Teachers have observed persistent gaps in both conceptual understanding and procedural competence, underscoring the need for more effective, learner-centered instructional strategies.

Empirical evidence consistently demonstrates that video-based instruction enhances learning outcomes, particularly in procedural and skill-based domains, by integrating visual and verbal information in ways that optimize cognitive processing and support meaningful learning. Cognitive theory of multimedia learning and cognitive load theory explain that well-designed instructional materials reduce extraneous cognitive processing while promoting schema construction and retention (Mayer, 2021; Sweller, Ayres, & Kalyuga, 2020; Brame, 2016). Meta-analytic findings further confirm that structured video design features such as segmentation, pacing, and signaling significantly improve student achievement (Noetel et al., 2021; Fyfield, Henderson, & Phillips, 2022). In agricultural and technical education contexts, video-based instruction has been widely shown to facilitate skills acquisition and knowledge transfer through clear visualization of complex procedures (Donkor, 2010; Karubanga et al., 2017; Abate et al., 2023), with similar benefits reported in technical-vocational learning environments (Apatan et al., 2023; Antonio, 2022; Salaño, 2023).

However, despite this growing body of evidence, there remains a limited number of empirically developed and evaluated contextualized video-based instructional materials specifically designed for organic mix feed preparation in junior high school agricultural education. Existing ICT-based studies in agriculture have not sufficiently addressed localized, curriculum-aligned multimedia interventions tailored to Grade 9 learners, indicating a clear instructional and research gap.

To address this gap, this study developed and evaluated a video-based supplementary learning material on organic mix feed for ducks among Grade 9 students at Hinunangan National High School. Guided by the ADDIE instructional design model (Molenda, 2003), the intervention was designed to enhance learners' conceptual understanding and procedural skills in agricultural education. The design was further informed by Keller's ARCS Model of Motivation (Keller, 2010) to support learner attention, relevance, confidence, and satisfaction.

Specifically, the study aimed to (1) identify learning gaps in ingredient identification, nutritional value, and preparation procedures; (2) develop a video-based instructional material addressing these gaps; (3) evaluate its effectiveness in improving students' content knowledge; and (4) determine its acceptability in terms of clarity, engagement, usefulness, and overall effectiveness.

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METHODS

Research Design

This study employed a developmental research design guided by the ADDIE instructional model (Branch, 2009; Aldoobie, 2015) to develop and evaluate a video-based supplementary learning material on organic mix feed for ducks. A quantitative pretest-posttest design was used to examine the effectiveness of the intervention in improving students' content knowledge and to assess learners' perceptions of the material in terms of clarity, engagement, relevance, and usefulness.

Research Locale

The study was conducted at Hinunangan National High School, Southern Leyte, Philippines. The school was selected due to its implementation of the Technology and Livelihood Education (TLE) curriculum specializing in Agriculture, which aligns with the focus of the study.

Participants

The participants were 51 Grade 9 students enrolled during the School Year 2025–2026. From an initial population of 63 students, only those present during the implementation period were included, resulting in a census of the accessible population. The study was limited to Grade 9 learners; therefore, generalization beyond the study site should be made with caution.

Research Instruments

The study utilized a researcher-developed 30-item achievement test administered as both pretest and posttest. The instrument was validated by experts in Agricultural Education, Animal Science, and a DepEd Master Teacher to ensure content validity and alignment with curriculum standards based on DepEd TLE competencies in Animal Production–Poultry.

All instruments underwent expert validation and pilot testing. Internal consistency reliability was determined using the Kuder-Richardson Formula 20 (KR-20), yielding a coefficient of 0.860, indicating good reliability (Kuder & Richardson, 1937). Revisions were made based on expert feedback prior to implementation.

Design and Development of the Video-Based Supplementary Learning Material

The video-based supplementary learning material was developed based on learning gaps identified in the pretest results, particularly in ingredient identification, nutritional understanding, and feed preparation procedures. A video-based instructional material was subsequently produced and evaluated by video and subject-matter experts to determine its quality, accuracy, and instructional suitability.

The development process followed the Analysis and Design phases of the ADDIE model (Branch, 2009), ensuring alignment with learner needs and DepEd curriculum competencies. The video incorporated structured demonstrations, sequential procedures, and contextual explanations to support comprehension and skill acquisition.

Instructional segmentation was applied to reduce cognitive load and enhance learning efficiency (Zheng, Jung, Li, & Yoon, 2022), consistent with principles of guided instruction (Kirschner, Sweller, & Clark, 2006).

The instructional design also followed multimedia learning principles emphasizing the integration of visual and verbal information to enhance cognitive processing and understanding (Mayer, 2009; Fiorella & Mayer, 2021).

Table 1: *Mapping of Learning Gaps to Video Design*

Learning Gap (from Pretest)	Video Component / Feature	How It Addresses the Gap
Students cannot identify ingredients (water lettuce, rice bran, madre de agua, golden apple snail, molasses)	Close-up visuals of each ingredient with labels and narration	Enables students to visually recognize and correctly name each ingredient

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Students lack understanding of nutritional value and function	Narrated explanations with practical examples of how each ingredient contributes to duck growth	Clarifies the purpose and nutritional importance of each ingredient in a meaningful context
Students are confused about preparation and feeding procedures	Step-by-step demonstration of mixing ingredients and feeding ducks	Guides students to follow the correct procedures independently and reduces errors during practice

The video was designed with structured instructional features, including labeled visuals, paced demonstrations, and narration, to facilitate learner comprehension and skill acquisition. Contextualization was integrated through the use of locally available materials and familiar agricultural practices relevant to the learners' environment.

Sampling Technique

A census sampling technique was employed. All Grade 9 students enrolled during the School Year 2025–2026 and present during implementation were included in the study, ensuring complete coverage of the accessible population.

Data Gathering Procedure

A pretest was administered to determine baseline knowledge of organic mix feed for ducks. The instructional material was then implemented during two Agriculture class sessions through guided viewing, discussion, and practical activities. A posttest was administered after the intervention to measure learning gains. A structured perception survey was conducted to assess acceptability in terms of clarity, engagement, relevance, usefulness, and overall effectiveness. Ethical considerations, including voluntary participation and confidentiality, were strictly observed throughout the study

Statistical Treatment of Data

Data were analyzed using descriptive and inferential statistics, including frequency, percentage, mean, and standard deviation. A paired-samples t-test ($\alpha = 0.05$) was used to determine significant differences between pretest and posttest scores. Effect size was computed using Cohen's d, and percentage gain was used to determine the magnitude of learning improvement.

RESULTS AND DISCUSSION

Pretest Performance and Learning Gaps

The pretest results indicated that 45.1% of students were classified under the "Needs Improvement" category. The mean pretest score was 13.43, and no students reached the "Excellent" level, indicating low prior knowledge in organic mix feed preparation among Grade 9 learners.

Table 1: *Pretest Score Distribution of Grade 9 Students on Organic Mix Feed*

Score Range	Description	Number of Students	Percentage (%)
27–30	Excellent	0	0%
22–26	Very Good	5	9.8%
18–21	Satisfactory	9	17.6%
14–17	Fair	14	27.5%
≤13	Needs Improvement	23	45.1%
Total		51	100%

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These results indicate limited baseline understanding and identify the need for instructional intervention. Analysis further revealed gaps in ingredient identification, nutritional understanding, and feed preparation procedures.

Effectiveness of the Intervention

A marked improvement was observed after the intervention. The mean posttest score (M = 23.08) exceeded the pretest score (M = 13.43), while the standard deviation decreased from 5.47 to 3.77, indicating improved performance and reduced variability.

Table 2 presents the pretest and posttest distribution.

Table 2. *Pretest and Posttest Performance Distribution of Grade 9 Students*

Performance Category	Pretest f	Pretest %	Posttest f	Posttest %
Excellent (27–30)	0	0%	11	21.6%
Very Good (22–26)	5	9.8%	23	45.1%
Satisfactory (18–21)	9	17.6%	14	27.5%
Fair (14–17)	14	27.5%	3	5.9%
Needs Improvement (≤13)	23	45.1%	0	0%
Total	51	100%	51	100%

Table 3 summarizes learning gains, showing a percentage gain of 71.85% and a large effect size (d = 1.64), indicating substantial instructional impact.

Table 3. Pretest and Posttest Summary Statistics and Learning Gains

Variable	Pretest	Posttest
Mean	13.43	23.08
Standard Deviation	5.47	3.77
Percentage Gain	—	71.85%
Effect Size (Cohen's d)	—	1.64 (very large)

Statistical Analysis of Learning Gains

The paired-samples t-test revealed a statistically significant difference between pretest and posttest scores, $t(50) = -11.72$, $p < .001$.

The weak and non-significant correlation ($r = .234$, $p = .099$) indicates that learning gains were independent of prior achievement, suggesting effectiveness across different ability levels.

Figure 1. *illustrates the increase in mean scores after the intervention.*

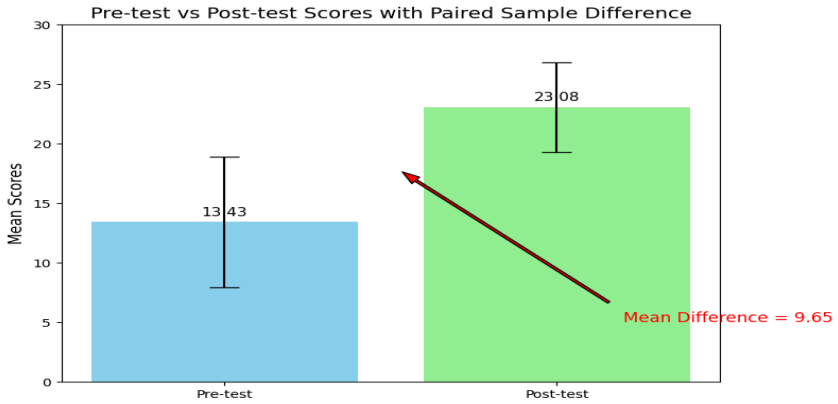

Figure 1. Comparison of Pretest and Posttest Mean Scores with Paired Sample Difference (n = 51)

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Figure 1 illustrates the increase in mean scores after the intervention. The posttest mean is visibly higher than the pretest means, indicating improved student performance following exposure to the video-based instructional material.

6. Students' Perception of the Instructional Material

Students rated the instructional material highly across all dimensions, with all indicators interpreted as "Highly Acceptable."

Table 4 presents the perception results.

Table 4. *Students' Perception and Evaluation of the Video-Based Supplementary Learning Material*

Criteria	Total Scores from Respondents	Mean	Remarks
Clarity of Instructions	197	3.86	Highly Acceptable
Content Understanding	195	3.82	Highly Acceptable
Relevance	184	3.60	Highly Acceptable
Interest and Engagement	194	3.80	Highly Acceptable
Visual Appeal	193	3.78	Highly Acceptable
Ease of Use	189	3.71	Highly Acceptable
Learning Effectiveness	198	3.88	Highly Acceptable

Learning effectiveness obtained the highest mean score, while relevance recorded the lowest, although both remained within the "Highly Acceptable" range.

Overall Findings

The findings demonstrate that the video-based instructional material significantly improved students' conceptual and procedural understanding of organic mix feed preparation. The large effect size and significant posttest gains indicate strong instructional effectiveness. The reduction in score variability suggests more consistent learning outcomes across students, indicating that the intervention supported learners regardless of prior ability level.

High acceptability ratings confirm positive learner reception in terms of clarity, engagement, usability, and effectiveness. These findings align with multimedia learning theory, which emphasizes that combining visual and verbal information enhances cognitive processing and improves learning outcomes. The results also support the value of contextualized instructional materials in agricultural education.

CONCLUSION

Based on the findings of the study, it is concluded that Grade 9 students initially exhibited learning gaps in organic mix feed preparation, particularly in identifying ingredients, understanding their nutritional functions, and performing proper preparation procedures. The developed video-based supplementary learning material effectively addressed these learning gaps through contextualized, visual, and step-by-step instruction aligned with DepEd Technology and Livelihood Education (TLE) competencies.

The significant improvement in students' content knowledge and the high acceptability ratings demonstrate that the material is an effective and appropriate supplementary instructional resource. Therefore, video-based and contextualized learning materials may serve as valuable tools for enhancing learning outcomes in agricultural education.

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