

# Development and Evaluation of Digitized Learning Materials in Teaching Agriculture and Fishery Arts for Grade 8 Students

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**Abstract:** *The study aimed to develop and evaluate digitized instructional materials aligned with the K–12 Agriculture and Fishery Arts curriculum. Specifically, the study assessed the learning and instructional needs of Grade 8 students and teachers in terms of digital engagement, ICT accessibility, learning and teaching interruptions, and teachers' digital readiness. Using a developmental-descriptive research design anchored on the Cognitive Theory of Multimedia Learning of Mayer, data were gathered from students, teachers, and validators through survey questionnaires and evaluation instruments. Findings revealed that students preferred multimedia-rich and interactive learning environments, while teachers demonstrated willingness to implement technology-based instruction despite experiencing ICT limitations and instructional interruptions. The developed digitized learning materials were highly observed in terms of learning objectives and competencies, multimedia integration, and alignment with the K–12 curriculum. Likewise, validators rated the materials highly effective in terms of content quality, instructional quality, technical quality, aesthetic and design quality, and accessibility and user-friendliness. The study concluded that the digitized learning materials were conceptually sound, instructionally effective, curriculum-aligned, and appropriate for Grade 8 Agriculture and Fishery Arts instruction.*

**Keywords:** Digitized Learning Materials, Agriculture and Fishery Arts, Multimedia Learning, Instructional Design, Grade 8 Learners

## I. INTRODUCTION

All academic fields now use different teaching and learning modalities as a result of the digital transformation in education. Information and communication technology (ICT) integration in the classroom has become a popular strategy to enhance student participation, promote active learning, and foster students' digital literacy. Digital technologies enhance the learning process by promoting interactivity, visualization, and learner autonomy, which gives abstract concepts more tangible and significant meaning (Cabero-Almenara and Llorente-Cejudo, 2020). This paradigm shift has impacted all educational levels, but it has been especially noticeable in Technical and Livelihood Education (TLE) courses like Agriculture and Fishery Arts (AFA), where both academic knowledge and practical application are crucial.

Through initiatives like the DepEd Computerization Program and the Digital Rise Program, the Department of Education (DepEd) emphasizes the value of incorporating ICT into classroom learning in the Philippine educational system. These programs seek to change how education is delivered and give students fair access to high-quality learning materials. According to studies by Villareal and Homillano (2024), one of the most important factors influencing the successful integration of technology in agriculture-based learning is the Technological Pedagogical Content Knowledge (TPACK) of agricultural teachers. Similarly, Vinuya and Alquizar (2025) discovered that the use



of digital instructional materials, such as instructional videos and interactive presentations much enhanced learners' understanding, engagement, and retention of concepts.

The growing body of research supports the educational benefits of digital learning resources. In their scoping assessment of educational technologies in agricultural education, Xu et al. (2023) found that ICT-based platforms had increased farmers' access to training and enhanced their motivation and comprehension. Furthermore, Paudi, Din, and Othman (2022) demonstrated that agricultural movies effectively maintained the interest of young farmers and enhanced the learning process. In a similar vein, Demapendan, Aquino, and Hilario (2024) created and verified printed pamphlets for TLE, demonstrating the necessity of interesting and contextually relevant teaching resources in livelihood-focused subjects

There are significant research gaps in the creation and assessment of digital learning resources tailored to junior high school Agriculture and Fishery Arts, despite growing scholarly interest. The majority of current research focuses on exploratory technology or general TLE issues rather than AFA, which necessitates contextualized, skills-based information. Additionally, few studies systematically assess usability, technological design, and learner motivation using both quantitative and qualitative measures, even though many focus on content validity and instructional quality (Villareal & Homillano, 2024; Vinuya & Alquizar, 2025).

In Philippine education, the digital gap is still a major problem. Villaseñor (2024) noted that a lack of digital resources, inconsistent internet connectivity, and inadequate teacher training in technology use persist in many public schools. In a similar vein, Arnado and Aviles (2023) found that, due to technological and infrastructure constraints, both educators and students in Indigenous Peoples Education (IPEd) schools encountered moderate to severe difficulties when using ICT.

Building on previous research by Vinuya and Alquizar (2025), Demapendan et al. (2024), and Nonato (2024), this study is different in three ways: (1) it focuses on Agriculture and Fishery Arts, a field that is underrepresented in studies on digitalization; (2) it uses both developmental and evaluative research approaches to evaluate acceptability, effectiveness, and usability; and (3) it incorporates the perspectives of teachers and students to produce a comprehensive understanding of contextual barriers and digital material performance.

Therefore, the goal of this study is to create and assess digital resources for teaching agriculture and fisheries arts to eighth-grade students. In particular, it aims to ascertain whether the created materials are acceptable in terms of content quality, instructional design, technical quality, and engagement; evaluate their efficacy based on performance on pre- and post-tests; and pinpoint the difficulties teachers and students face when utilizing them. By tackling these goals, we can contribute to the scant research on AFA digitization in the Philippines.

## **II. STATEMENT OF THE PROBLEM**

This study aimed to **develop and evaluate digitized learning materials** in teaching **Agriculture and Fishery Arts (AFA)** for **Grade 8 learners**.

Specifically, it seeks to answer the following questions:

1. What are the learning and instructional needs of Grade 8 students and teachers' instructional challenges and needs in delivering lessons using digital format in Agriculture and Fishery Arts in terms of:
  - 1.1 Student respondents
    - 1.1.1 preferred learning styles and digital engagement;
    - 1.1.2 availability and accessibility of ICT resources in the school; and
    - 1.1.3 learning interruptions?
  - 1.2 Teacher respondents
    - 1.2.1 availability and accessibility of ICT resources in the school
    - 1.2.2 teaching interruptions; and
    - 1.2.3 Teachers' digital competence and readiness to implement technology-based instruction?



2. To what extent do the digitized learning materials are conceptually and instructionally designed based on:
  - 2.1 identified learning objectives and competencies;
  - 2.2 integration of multimedia and interactive features; and
  - 2.3 alignment with the K–12 Agriculture and Fishery Arts curriculum?
3. What is the evaluation on the effectiveness of the developed digitized learning materials as evaluated in terms of:
  - 3.1 content quality;
  - 3.2 instructional quality;
  - 3.3 technical quality;
  - 3.4 Aesthetic and Design Quality and
  - 3.5 Accessibility and User-Friendliness?

### **III. METHODS**

#### **Research Design**

A developmental design was employed in this study to measure the effectiveness of the developed materials through pretest and post-test. The descriptive component aims to gather and analyze the perceptions of Grade 8 teachers and students regarding the usability, acceptability, and effectiveness of the digitized learning materials in Agriculture and Fishery Arts (AFA). The developmental component involves systematically creating these materials using the ADDE instructional design framework. This dual approach ensures both the practical development and empirical evaluation of the digital resources in real classroom settings.

#### **Research Environment**

The study was conducted in selected public secondary schools in the Surigao City Division, which is situated in the northeastern region of Mindanao, the Philippines, will be the sites of the study. The division comprises several schools that serve a wide range of students from diverse socioeconomic backgrounds and are located in both urban and coastal barangays. The Department of Education (DepEd) Surigao City Division oversees these schools and consistently works to advance high-quality, cutting-edge instruction in accordance with the K–12 Curriculum. Particularly in fields like agriculture and fisheries arts, which combine theoretical knowledge and practical skills, the environment offers an appropriate setting for assessing the efficacy of digital learning resources.

#### **Research Respondents**

The respondents of the study were 132 learners and teachers in selected public secondary schools in surigao city division. Purposive sampling will be used in the selection of responders, allowing the researcher to choose faculty members with relevant training, expertise, and experience in online learning materials. This approach will ensure that the information acquired is significant and aligns with the study's goals. Table 1, which represents the number of faculty members from each institution that participated, will display the distribution of responders from the designated institutions.

#### **Research Instrument**

A structured questionnaire serve as the primary research instrument in this study. Its goal is to collect vital information about the creation and assessment of digital learning resources for teaching Agriculture and Fishery Arts (AFA) to eighth-grade students. In accordance with the goals of the study, the questionnaire is intended to assess the acceptability, usability, and efficacy of the generated materials.

There are four major parts to the instrument. The assessment of the digital learning resources in terms of technological quality, instructional design, content quality, engagement and interactivity, and language appropriateness and clarity is the main objective of Part I. Teachers' and students' opinions about the materials' usefulness and ability to improve



concept comprehension, skill application, and learning motivation are gathered in Part II. Part III identifies the challenges encountered by users when utilizing the digitized materials, while Part IV compiles the recommendations of respondents for improving and sustaining the use of such digital resources.

To ensure content and face validity, the questionnaire will undergo expert validation by a panel composed of the research adviser and three subject matter experts in educational technology, curriculum development, agriculture, and fishery arts. Their comments will be carefully considered to refine the clarity, structure, and relevance of the items. This step ensures that all questions accurately represent the intended constructs and align with the study's framework and objectives.

Following the validation, a pilot test will be conducted with a small group of respondents—five (5) teachers and five (5) Grade 8 students who are not part of the main study. Cronbach's Alpha will be used to assess the internal consistency of the pilot test data. A reliability coefficient of 0.80 or higher will indicate that the instrument is reliable and suitable for full-scale use in the actual data collection.

Overall, the validation procedures for both the questionnaire and the digitized learning system aim to ensure that all tools and materials used in this study are accurate, reliable, pedagogically sound, and aligned to enhance teaching and learning in Agriculture and Fishery Arts.

#### IV. DATA ANALYSIS

The following statistical tools **will be utilized** to analyze the data that **will be gathered** from the respondents:

**Frequency Count and Percentage.** These statistical tools will be employed to determine and describe the profile of the respondents. The frequency count will identify how often each response occurs, while the percentage will present the proportion of each response in relation to the total number of participants. These descriptive statistics will provide a clear overview of the respondents' demographic characteristics and other relevant background information.

**Median.** The median will be used as a measure of central tendency to determine the typical or middle rating given by the respondents in evaluating the digitized learning materials. It is deemed the most appropriate measure since it offers a more accurate representation of the central response, particularly for ordinal data obtained from rating scales. The use of the median ensures that the analysis reflects the respondents' collective assessment while minimizing the influence of extreme scores.

**Ordinal Rank.** This tool will be applied to identify and rank the extent of respondents' assessments on the analysis and relevance of the digitized learning materials.

#### V. RESULTS AND DISCUSSIONS

##### LEARNING AND INSTRUCTIONAL NEEDS OF GRADE 8 STUDENTS AND TEACHERS' INSTRUCTIONAL CHALLENGES AND NEEDS IN DELIVERING LESSONS USING DIGITAL FORMAT IN AGRICULTURE AND FISHERY ARTS IN TERMS OF STUDENT RESPONDENTS IN PREFERRED LEARNING STYLES AND DIGITAL ENGAGEMENT, AVAILABILITY AND ACCESSIBILITY OF ICT RESOURCES IN THE SCHOOL AND LEARNING INTERRUPTIONS.

##### Student's perception in preferred learning styles and digital engagement, availability and accessibility of ICT resources in the school and learning interruptions

Table 2 presents the Student perception in preferred learning styles and digital engagement, availability and accessibility of ICT resources in the school and learning interruptions.

Table 2.

Student's perception in preferred learning styles and digital engagement, availability and accessibility of ICT resources in the school and learning interruptions.

A	Preferred Learning Styles and Digital Engagement	Mean	SD	QD
1	I understand AFA lessons better when videos are used.	4.64	0.510	Strongly Agree
2	I prefer lessons with pictures, diagrams, and animations.	4.64	0.507	Strongly Agree



3	Interactive activities (quizzes, digital tasks) help me learn better.	4.56	0.510	Strongly Agree
4	I am more motivated to learn AFA when lessons are in digital format.	4.52	0.490	Strongly Agree
5	I can easily follow digital instructions for practical AFA activities.	4.64	0.490	Strongly Agree
<b>B</b>	<b>Availability and Accessibility of ICT Resources in the School</b>			
1	I have access to a gadget (phone, tablet, or computer) for AFA learning.	4.68	0.510	Strongly Agree
2	Internet connection is available when I need it for AFA lessons.	4.6	0.490	Strongly Agree
3	The school provides enough ICT resources for digital learning.	4.52	0.507	Strongly Agree
4	I can access digital AFA materials anytime.	4.52	0.476	Strongly Agree
5	Technical problems limit my participation in digital lessons.	4.56	0.500	Strongly Agree
<b>C</b>	<b>Learning Interruptions</b>			
1	Internet problems interrupt my learning in AFA.	4.6	0.510	Strongly Agree
2	Power interruptions affect my participation in digital lessons.	4.64	0.510	Strongly Agree
3	I miss or delay activities due to lack of gadgets or connectivity.	4.64	0.507	Strongly Agree
4	Home responsibilities interrupt my digital learning.	4.56	0.510	Strongly Agree
5	Learning interruptions affect my performance in AFA.	4.52	0.490	Strongly Agree

Table 2 presents the students' perceptions regarding their preferred learning styles and digital engagement, availability and accessibility of ICT resources in the school, and the learning interruptions they experience in digital instruction for Agriculture and Fishery Arts (AFA). The consistently high mean scores ( $\bar{x} = 4.52-4.68$ ) with low standard deviation values indicate a strong convergence of student responses, signifying shared experiences and perceptions. In the context of the Analysis phase of the ADDIE model, these results reveal critical instructional gaps between learner needs and existing instructional conditions.

Results under Category A show that students strongly agree that they understand AFA lessons better when videos, images, diagrams, animations, and interactive digital activities are used ( $\bar{x} = 4.52-4.64$ ). These findings confirm that students favor visual and interactive multimedia learning environments, which are particularly appropriate for skill-oriented subjects such as Agriculture and Fishery Arts.

However, these strong preferences are contrasted with the limited availability of structured, multimedia-rich AFA instructional materials, especially in public secondary schools. According to the ADDIE framework, the Analysis phase requires alignment between learner characteristics and instructional formats to ensure effective design outcomes (Dick, Carey, & Carey, 2015). Studies published between 2023 and 2025 consistently demonstrate that video-based demonstrations and interactive digital activities significantly enhance engagement, comprehension, and motivation among secondary learners, particularly in applied and technical subjects (Zolkwer et al., 2023; Rahman et al., 2024). The absence or insufficiency of such materials therefore represents a clear instructional gap that must be addressed in the subsequent Design and Development phases of ADDIE.



Category B of Table 2 reveals that students strongly agree that they have access to gadgets, internet connectivity, and school-provided ICT resources ( $\bar{x} = 4.52-4.68$ ). Despite these high ratings, students also strongly agree that technical problems limit their participation in digital lessons ( $\bar{x} = 4.56$ ). This apparent contradiction indicates a functional gap rather than a simple access gap—students may possess devices and connectivity, but the quality, reliability, and readiness of ICT infrastructure remain insufficient for sustained digital instruction.

Recent national data from the 2024 National ICT Household Survey highlight that while access to digital devices has improved in many regions, challenges related to internet stability, speed, affordability, and institutional infrastructure persist, particularly in public schools and rural areas (Philippine Statistics Authority, 2025). In ADDIE Analysis terms, this gap underscores environmental and contextual constraints that must be considered during instructional planning to prevent implementation failure (Gustafson & Branch, 2007).

Category C shows that students strongly agree that learning interruptions—such as internet problems, power interruptions, lack of gadgets, and home responsibilities—affect their participation and performance in AFA ( $\bar{x} = 4.52-4.64$ ). These findings reveal a substantial gap between the requirements of continuous digital learning and the realities of students’ learning environments.

Empirical studies conducted in the Philippines and Southeast Asia indicate that learning interruptions are among the most persistent barriers to effective digital education, leading to disengagement, delayed task submission, and reduced learning outcomes (Manguilimotan et al., 2025; Dela Cruz, 2024). The ADDIE Analysis phase explicitly calls for identifying such constraints to inform flexible, resilient instructional solutions, including asynchronous materials and offline-capable resources (Nichols et al., 2024). The high agreement on learning interruptions in Table 2 therefore highlights the need for instructional designs that can withstand contextual disruptions.

**Teachers’ perception in terms of availability and accessibility of ICT resources in the school, teaching interruptions, and Teachers’ digital competence and readiness to implement technology-based instructions.**

Table 3 presents the teachers’ perception in terms of availability and accessibility of ICT resources in the school, teaching interruptions, and teachers’ digital competence and readiness to implement technology-based instructions.

**Table 3. Teachers’ perception in terms of availability and accessibility of ICT resources in the school, teaching interruptions, and Teachers’ digital competence and readiness to implement technology-based instruction.**

A	Availability and Accessibility of ICT Resources in the School	mean	SD	QD
1	The school has sufficient ICT equipment for digital instruction.	4.48	0.51	Strongly Agree
2	Internet connectivity in school supports digital teaching needs.	4.56	0.51	Strongly Agree
3	I have access to ICT tools whenever needed for lesson delivery.	4.32	0.63	Strongly Agree
4	ICT limitations affect my ability to deliver AFA lessons digitally.	4.52	0.65	Strongly Agree
B	Teaching Interruptions			
1	Internet problems interrupt my digital AFA lessons.	4.52	0.77	Strongly Agree
2	Power interruptions affect lesson flow and continuity.	4.68	0.56	Strongly Agree
3	Technical issues delay the completion of planned lessons.	4.36	0.76	Strongly Agree
4	Student access issues interrupt effective teaching.	4.72	0.54	Strongly Agree
C	Teachers’ Digital Competence and Readiness			
1	I am confident in using digital tools for AFA instruction.	4.60	0.58	Strongly Agree
2	I can design interactive digital lessons in AFA.	4.44	0.65	Strongly Agree
3	I am ready to implement technology-based instruction regularly.	4.36	0.64	Strongly Agree
4	I need more training on digital teaching strategies.	4.52	0.65	Strongly Agree
5	I am willing to use digital instructional materials for AFA.	4.48	0.65	Strongly Agree



Results under Category A show that teachers strongly agree that their schools possess ICT equipment and internet connectivity that support digital instruction ( $\bar{x} = 4.32\text{--}4.56$ ). However, the item stating that “ICT limitations affect my ability to deliver AFA lessons digitally” also received a strong agreement rating ( $\bar{x} = 4.52$ ). This reveals a significant gap between resource availability and resource adequacy for pedagogical purposes.

Recent studies emphasize that while many schools now possess basic ICT infrastructure, teachers often encounter limitations related to shared equipment, insufficient bandwidth, outdated hardware, and lack of technical support, which directly affect lesson delivery (OECD, 2023; UNESCO, 2024). These findings align with the ADDIE Analysis principle that instructional planning must consider not only the presence of resources but also their functional reliability and instructional suitability (Gustafson & Branch, 2007). Thus, the gap identified in Table 3 highlights the need for instructional solutions that are teacher-manageable and resilient to infrastructure constraints.

Category B reveals that teaching interruptions are a major challenge, with teachers strongly agreeing that internet problems, power interruptions, technical issues, and student access concerns interrupt digital AFA lessons ( $\bar{x} = 4.36\text{--}4.72$ ). The highest mean was recorded for student access issues ( $\bar{x} = 4.72$ ), suggesting that even when teachers are prepared to teach digitally, learner-side constraints undermine instructional effectiveness.

This gap mirrors findings in recent Southeast Asian and Philippine studies indicating that teaching interruptions remain one of the most persistent barriers to technology-based instruction, particularly in skills-oriented subjects (Cahapay, 2024; Manguilimotan et al., 2025).

Category C indicates that teachers generally perceive themselves as confident and willing to use digital tools for AFA instruction ( $\bar{x} = 4.36\text{--}4.60$ ). However, the strong agreement with the item “I need more training on digital teaching strategies” ( $\bar{x} = 4.52$ ) reveals a critical competence gap—confidence does not equate to instructional mastery.

Contemporary literature distinguishes between technical digital skills and digital pedagogical competence. UNESCO’s ICT Competency Framework for Teachers (2023) stresses that effective technology integration requires the ability to design interactive, learner-centered, and contextually relevant lessons, not merely operate digital tools. Similarly, recent empirical studies show that teachers often feel confident using basic digital platforms but lack advanced skills in instructional design, multimedia integration, and assessment in digital environments (Amilusholihah et al., 2024; OECD, 2023).

From the lens of ADDIE, this gap underscores the importance of developing instructional materials that are pedagogically embedded, easy to use, and aligned with teachers’ current competence levels, while also serving as practical models of effective digital instruction.

Table 3 demonstrates that teachers are motivated and open to digital instruction, yet face systemic and pedagogical constraints that limit effective implementation. The Analysis phase of the ADDIE model requires a clear understanding of these constraints to ensure that the resulting instructional design is feasible, context-sensitive, and sustainable (Dick et al., 2015).

The identified gaps—namely (1) functional ICT limitations, (2) frequent teaching interruptions, and (3) the need for deeper digital pedagogical training—justify the development of a contextualized digital instructional material for Agriculture and Fishery Arts. Such an intervention should minimize dependence on high-level infrastructure, allow flexible use across disrupted learning conditions, and support teachers’ instructional growth.

Synthesis with Table 2 (Students’ Perceptions).

When analyzed alongside Table 2, the findings of Table 3 confirm a shared gap environment: students are highly motivated to learn digitally, and teachers are willing to teach digitally, yet both groups are constrained by infrastructural, contextual, and pedagogical limitations. This convergence strongly validates the ADDIE-based need analysis and provides a solid empirical foundation for proceeding to the Design and Development phases.



**EXTENT OF THE DIGITIZED LEARNING MATERIALS ARE CONCEPTUALLY AND INSTRUCTIONALLY DESIGNED BASED ON IDENTIFIED LEARNING OBJECTIVES AND COMPETENCIES, INTEGRATION OF MULTIMEDIA AND INTERACTIVE FEATURES, AND ALIGNMENT WITH THE K-12 AGRICULTURE AND FISHERY ARTS CURRICULUM**

Table 4 presents the extent of the digitized learning materials based on identified learning objectives and competencies, integration of multimedia and interactive features, and alignment with the K-12 Agriculture and Fishery Arts curriculum

Table 4.

Extent of the digitized learning materials based on identified learning objectives and competencies, integration of multimedia and interactive features, and alignment with the K-12 Agriculture and Fishery Arts curriculum

A	Identified Learning Objectives and Competencies	Mean	SD	Verbal Interpretation
1	The learning objectives are clearly stated in the digitized materials.	4.48	0.51	Highly observed
2	The objectives are understandable and appropriate for Grade 8 learners.	4.36	0.70	Highly observed
3	The lessons address the intended competencies in Agriculture and Fishery Arts.	4.28	0.68	Highly observed
4	Activities and assessments are aligned with the stated learning objectives.	4.32	0.80	Highly observed
5	The content depth is appropriate to the targeted competencies.	4.28	0.79	Highly observed
<b>B</b>	<b>Integration of Multimedia and Interactive Features</b>			
1	Videos, images, and animations support the understanding of AFA concepts.	4.60	0.65	Highly observed
2	Multimedia elements are relevant to the lesson objectives.	4.26	0.85	Highly observed
3	Interactive features (e.g., quizzes, activities, simulations) enhance learning engagement.	4.56	0.71	Highly observed
4	Multimedia elements are appropriately placed and not distracting.	4.26	0.85	Highly observed
5	The digitized materials encourage active participation and self paced learning.	4.32	0.80	Highly observed
<b>C</b>	<b>Alignment with the K-12 Agriculture and Fishery Arts Curriculum</b>			
1	The content is aligned with the K-12 AFA curriculum standards.	4.34	0.72	Highly observed
2	Lessons follow the prescribed learning competencies for Grade 8 AFA.	4.30	0.82	Highly observed
3	Practical activities reflect real-life agricultural and fishery applications.	4.48	0.65	Highly observed
4	The materials support the development of skills required in AFA.	4.44	0.71	Highly observed
5	The digitized lessons are appropriate for the learners' grade level and context.	4.48	0.51	Highly observed



Table 4 presents the evaluation of the digitized learning materials in terms of (A) identified learning objectives and competencies, (B) integration of multimedia and interactive features, and (C) alignment with the K–12 Agriculture and Fishery Arts (AFA) curriculum. The overall results indicate that all indicators were rated “Highly Observed,” with mean scores ranging from 4.26 to 4.60 and relatively low standard deviation values, suggesting a high level of consistency in respondents’ perceptions. In the context of the ADDIE model, these findings demonstrate that the outputs of the Design and Development phases effectively addressed the gaps identified during the Analysis phase.

The results under Category A show that the digitized learning materials were highly effective in presenting clear, appropriate, and competency-based learning objectives ( $\bar{x} = 4.28\text{--}4.48$ ). Respondents strongly agreed that the objectives were clearly stated, understandable for Grade 8 learners, and aligned with the intended AFA competencies. Furthermore, the strong rating for alignment between activities, assessments, and objectives indicates strong internal instructional coherence.

These findings are consistent with instructional design literature emphasizing that clearly articulated objectives are foundational to effective digital learning environments. According to Dick, Carey, and Carey (2023), instructional materials that explicitly link objectives, content, and assessment promote better comprehension and skill mastery. Recent studies also reveal that competency-aligned digital materials significantly improve learning outcomes in technical-vocational subjects such as Agriculture and Fishery Arts (Rahman & Borhan, 2024; Dangle & Sumaoang, 2023). Thus, the high ratings in this category confirm that the digitized learning materials are conceptually sound and instructionally grounded.

Category B received some of the highest mean scores in Table 4, particularly for the use of videos, images, animations, and interactive features that enhance learner engagement ( $\bar{x} = 4.32\text{--}4.60$ ). Respondents strongly agreed that multimedia elements supported conceptual understanding, were relevant to lesson objectives, and encouraged active participation and self-paced learning.

These results align with Cognitive Theory of Multimedia Learning, which posits that learning is more effective when information is presented through appropriately integrated visual and verbal elements (Mayer, 2023). Recent empirical studies emphasize that multimedia-rich and interactive digital materials increase motivation, engagement, and retention among secondary learners, especially in skills-based disciplines (OECD, 2023; Zulkifli et al., 2024). The high level of observation in this category reflects that the digitized learning materials successfully leveraged multimedia not merely for presentation, but as a strategic instructional component—addressing one of the major gaps identified in the ADDIE Analysis phase regarding learner engagement.

Results under Category C indicate that the digitized learning materials were highly aligned with the K–12 AFA curriculum, with mean scores ranging from 4.30 to 4.48. Respondents strongly agreed that the content followed prescribed learning competencies, reflected real-life agricultural and fishery applications, supported skills development, and was appropriate for the learners’ grade level and context.

Curriculum alignment is a critical indicator of instructional validity, particularly in government-mandated programs such as the Philippine K–12 curriculum. The Department of Education emphasizes that digital instructional materials must strictly adhere to curriculum standards while contextualizing learning to learners’ environments (DepEd, 2024). Similarly, UNESCO (2023) highlights that effective digital learning resources in technical and vocational education should integrate authentic, real-world tasks aligned with curriculum competencies. The findings in Table 4 therefore confirm that the digitized materials are not only pedagogically sound but also curriculum-responsive.

Within the ADDIE framework, Table 4 represents evidence from the Evaluation Phase, demonstrating that the digitized learning materials successfully met their intended instructional purpose. The consistently high ratings across all dimensions indicate that the materials effectively addressed the previously identified gaps in learner engagement, instructional alignment, and curriculum relevance.

According to Branch and Dousay (2024), evaluation results that show high alignment between objectives, content, and learner needs validate the instructional design decisions made during earlier ADDIE phases and justify wider implementation. Hence, the findings support the conclusion that the digitized learning materials for Agriculture and



Fishery Arts are instructionally effective, curriculum-aligned, and appropriate for Grade 8 learners, making them suitable for classroom adoption and possible scaling.

Overall, Table 4 demonstrates that the digitized learning materials were highly observed to be conceptually and instructionally well-designed. The strong alignment with learning objectives, effective integration of multimedia and interactive features, and adherence to the K–12 Agriculture and Fishery Arts curriculum collectively indicate that the developed materials meet established standards of quality digital instruction. These results affirm the effectiveness of the ADDIE-based development process and provide empirical support for the continued use and refinement of the digitized learning materials.

**EVALUATION ON THE EFFECTIVENESS OF THE DEVELOPED DIGITIZED LEARNING MATERIALS AS EVALUATED IN TERMS OF CONTENT QUALITY, INSTRUCTIONAL QUALITY, TECHNICAL QUALITY, AESTHETIC AND DESIGN QUALITY AND ACCESSIBILITY AND USER-FRIENDLINESS**

**Evaluation in the effectiveness of the developed digitized learning materials in terms of Content Quality**

Table 5 presents the evaluation in the effectiveness of the developed digitized learning materials in terms of Content Quality

Table 5.

Validators’ Evaluation in the effectiveness of the developed digitized learning materials in terms of **Content Quality**.

Content Quality	Mean	SD	QD
1. The content of the digitized learning materials is aligned with the K–12 curriculum in Agriculture and Fishery Arts.	4.52	0.51	Highly observed
2. The topics are accurate and based on updated information and standards.	4.60	0.65	Highly observed
3. The lessons presented are comprehensive and well-organized.	4.52	0.65	Highly observed
4. Examples and exercises are relevant to real-life agricultural and fishery practices.	4.64	0.64	Highly observed
5. The content fosters critical thinking and practical application of skills.	4.44	0.82	Highly observed

Validators strongly affirmed that the content of the digitized learning materials is aligned with the K–12 AFA curriculum, accurate, comprehensive, and grounded in real-life agricultural and fishery practices ( $\bar{x}$  = 4.44–4.64). The high ratings for alignment and authenticity indicate that the materials effectively translate curriculum standards into relevant, practice-oriented learning experiences.

These findings are consistent with research emphasizing that curriculum-aligned and contextually authentic content enhances learning transfer in technical and vocational subjects (Alvarez & Baraquia, 2023). Standards-aligned digital content has also been shown to support coherence and instructional validity, particularly when validated by subject-matter experts (Rice & Ortiz, 2023).

**Evaluation in the effectiveness of the developed digitized learning materials in terms of Instructional Quality**

Table 6 presents the evaluation in the effectiveness of the developed digitized learning materials in terms of Instructional Quality



Table 6.

Validator's evaluation in the effectiveness of the developed digitized learning materials in terms of **Instructional Quality**.

<b>Instructional Design</b>	Mean	SD	QD
1. The materials follow a clear sequence from simple to complex lessons.	4.60	0.71	Highly observed
2. Learning objectives are clearly stated and achievable.	4.68	0.63	Highly observed
3. The activities promote active learning and student engagement.	4.60	0.76	Highly observed
4. The assessments are aligned with learning objectives and competencies.	4.72	0.61	Highly observed
5. The instructional flow allows learners to progress at their own pace.	4.40	0.82	Highly observed

Table 6 shows very high ratings for instructional sequencing, clarity of objectives, alignment of assessments, and learner pacing ( $\bar{x} = 4.40-4.72$ ). Validators agreed that lessons progress from simple to complex and that activities promote active learning.

Instructional design research underscores that clear learning objectives, aligned assessments, and opportunities for self-paced progression are hallmarks of effective digital instruction (Dick, Carey, & Carey, 2023). Recent evaluations of digital modules using ADDIE demonstrate that well-sequenced instruction significantly improves learner engagement and achievement (Tatli et al., 2023). The results thus confirm that the materials reflect sound instructional design principles.

**Evaluation in the effectiveness of the developed digitized learning materials in terms of Technical Quality**

Table 7. Validators' Evaluation in the effectiveness of the developed digitized learning materials in terms of Technical Quality.

Table 7.

Validators' Evaluation in the effectiveness of the developed digitized learning materials in terms of **Technical Quality**.

<b>Technical Quality</b>	Mean	SD	QD
1. The digitized materials load properly and function without technical errors.	4.80	0.50	Highly observed
2. The visuals (images, graphics, and videos) are clear and of high quality.	4.36	0.76	Highly observed
3. The audio components (if any) are crisp and easy to understand.	4.44	0.71	Highly observed
4. Navigation through the materials is easy and user-friendly.	4.64	0.64	Highly observed
5. The file size and format are compatible with most digital devices.	4.72	0.54	Highly observed

The highest mean scores were recorded under Technical Quality ( $\bar{x} = 4.36-4.80$ ), particularly for system functionality and compatibility across devices. Validators agreed that the materials load properly, are easy to navigate, and use high-quality visuals and audio.



Technical reliability is a critical determinant of sustained digital learning use. Studies on digital instructional material evaluation emphasize that usability, compatibility, and stability directly affect learner satisfaction and instructional continuity (Rice & Ortiz, 2023). Similarly, technical robustness is identified as a non-negotiable criterion in contemporary instructional material evaluation tools (IMET, 2023).

**Interactivity**

Table 8 presents validators’ evaluation in the effectiveness of the developed digitized learning materials in terms of Engagement and Interactivity

Table 8.

Validators’ Evaluation in the effectiveness of the developed digitized learning materials in terms of **Engagement and Interactivity**.

Engagement and Interactivity	Mean	SD	QD
1. The materials capture the learners’ interest and attention.	4.64	0.57	Highly observed
2. Interactive activities encourage active participation.	4.52	0.77	Highly observed
3. The materials include features (e.g., quizzes, simulations) that reinforce learning.	4.68	0.56	Highly observed
4. The visual and interactive design keeps learners motivated to complete tasks.	4.28	0.79	Highly observed
5. The materials allow learners to receive feedback immediately after activities.	4.60	0.65	Highly observed

Table 8 indicates that validators highly observed the materials’ ability to capture learner interest, promote interaction, provide immediate feedback, and sustain motivation ( $\bar{x} = 4.28-4.68$ ). Interactive features such as quizzes and simulations were recognized as mechanisms that reinforce learning.

Contemporary learning science literature affirms that interactive multimedia fosters deeper engagement and improves learning outcomes when integrated purposefully (Mayer, 2023; Budiarto et al., 2026). Recent secondary-level studies also show that interactive digital tools significantly increase students’ motivation and active participation (Zbereanu, 2024; Hafundar, 2025).

**Evaluation in the effectiveness of the developed digitized learning materials in terms of Language Clarity and Appropriateness**

Table 9 presents the validators’ Evaluation in the effectiveness of the developed digitized learning materials in terms of Language Clarity and Appropriateness

Table 9.

Validators’ Evaluation in the effectiveness of the developed digitized learning materials in terms of **Language Clarity and Appropriateness**.

Language Clarity and Appropriateness	Mean	SD	QD
1. The language used is simple and easy to understand.	4.64	0.57	Highly observed
2. Instructions are clear, concise, and free from ambiguity.	4.51	0.74	Highly observed
3. The vocabulary level is appropriate for Grade 8 learners.	4.64	0.56	Highly



			observed
4. The materials are free from grammatical or typographical errors.	4.28	0.79	Highly observed
5. The tone and language encourage positive learning experiences.	4.60	0.65	Highly observed

Validators strongly agreed that the language used is clear, grade-appropriate, grammatically correct, and supportive of positive learning experiences ( $\bar{x}$  = 4.28–4.64). Clear instructions and appropriate vocabulary are particularly important in digital environments, where learners often rely on self-direction.

Research on digital instructional materials highlights that language clarity reduces cognitive load and supports learner independence, especially in self-paced modules (OECD, 2023; Srivastava & Srivastav, 2024). The findings in Table 9 thus confirm the linguistic accessibility of the materials.

### Evaluation in the effectiveness of the developed digitized learning materials in terms of Perceptions on Usability and Effectiveness

Table 10 presents validators' evaluation in the effectiveness of the developed digitized learning materials in terms of Perceptions on Usability and Effectiveness

Table 10.

Validators' Evaluation in the effectiveness of the developed digitized learning materials in terms of **Perceptions on Usability and Effectiveness**.

Perceptions on Usability and Effectiveness	mean	SD	QD
1. The digitized learning materials enhance my understanding of AFA concepts.	4.44	0.65	Highly observed
2. The materials help me apply what I have learned in practical tasks.	4.48	0.65	Highly observed
3. The materials increase my motivation to learn AFA.	4.56	0.65	Highly observed
4. The materials encourage independent and self-paced learning.	4.40	0.76	Highly observed
5. The materials contribute to the development of 21st-century skills (e.g., digital literacy, problem-solving).	4.68	0.56	Highly observed

Table 10 shows that validators perceived the digitized learning materials as effective in enhancing conceptual understanding, practical application, motivation, self-paced learning, and 21st-century skills ( $\bar{x}$  = 4.40–4.68). These results suggest that the materials do not merely present content but actively support skill development and learner autonomy.

Recent evaluations of standards-aligned digital materials indicate that high usability correlates with improved learner outcomes and greater acceptance among educators (RAND AIRS, 2025). Digital tools designed with usability and effectiveness in mind are also linked to gains in digital literacy and problem-solving skills (Budiarto et al., 2026).

## VI. CONCLUSIONS

- Grade 8 learners in Agriculture and Fishery Arts highly prefer multimedia-rich and interactive digitized learning environments because these enhance their understanding, engagement, and motivation in learning. However, learning interruptions such as unstable internet connection, technical problems, power interruptions, and limited accessibility continue to affect the effectiveness of digital learning.



2. Teachers are willing and generally prepared to implement technology-based instruction in Agriculture and Fishery Arts; however, infrastructural limitations, teaching interruptions, and the need for further digital pedagogical training remain significant challenges in the effective delivery of digital instruction.
3. The developed digitized learning materials were conceptually and instructionally sound because they contained clearly defined learning objectives, effectively integrated multimedia and interactive features, and were aligned with the K–12 Agriculture and Fishery Arts curriculum and learner competencies.
4. The developed digitized learning materials were effective instructional tools for Grade 8 Agriculture and Fishery Arts learners as evidenced by the high evaluation ratings in content quality, instructional quality, technical quality, aesthetic and design quality, and accessibility and user-friendliness, making them appropriate for classroom implementation and digital learning environments.

### **VII. RECOMMENDATIONS**

1. School administrators should strengthen ICT infrastructure, improve internet stability, and provide adequate digital resources to support the effective implementation of digitized instructional materials in Agriculture and Fishery Arts and other subjects.
2. Teachers should continuously enhance their digital pedagogical competencies through training, seminars, and workshops focusing on multimedia integration, interactive instructional design, and technology-based teaching strategies.
3. Students should maximize the use of digitized learning materials to improve independent learning, digital literacy, engagement, and practical skill development in Agriculture and Fishery Arts.
4. Curriculum developers and instructional designers should continue developing contextualized, multimedia-rich, and interactive digitized instructional materials aligned with the K–12 curriculum and responsive to learners' needs and learning environments.
5. The Department of Education should support the wider implementation and evaluation of digitized learning materials in technical-vocational subjects such as Agriculture and Fishery Arts by providing policy support, teacher training programs, and sustainable ICT infrastructure.
6. Future researchers may conduct experimental studies to determine the impact of digitized learning materials on students' academic performance, practical skills acquisition, motivation, and long-term learning outcomes in Agriculture and Fishery Arts and other technical-vocational disciplines.

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