

The Effect of ADDIE-Based ESP Materials on Vocational Students' Skills in Brackish and Marine Aquaculture Agribusiness

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Abstract:

This study investigates the effect of ADDIE-based English for Specific Purposes (ESP) reading materials on vocational students' reading comprehension in the Brackish and Marine Aquaculture Agribusiness program. The research addresses the issue of students' low reading comprehension due to the use of general English materials that are not aligned with their vocational needs. A pre-experimental one-group pre-test and post-test design was employed, involving 25 vocational students selected through purposive sampling. The instructional materials were systematically developed using the ADDIE model to ensure relevance to students' field of study. Data were collected through reading comprehension tests and a student effectiveness questionnaire. The results revealed a significant improvement in students' reading comprehension, as indicated by an increase in the mean score from 62 (pre-test) to 81 (post-test), with a gain score of 19. The normalized gain score of 0.5 suggests moderate effectiveness of the intervention. Additionally, the questionnaire results showed a mean score of 4.3, indicating that students perceived the materials as very effective. The findings demonstrate that ESP-based reading materials, when developed systematically using the ADDIE model, can significantly enhance vocational students' reading comprehension, motivation, and confidence. Therefore, integrating contextualized and discipline-specific materials into vocational English instruction is highly recommended to support both language proficiency and professional literacy.

Keywords: ADDIE Model; Aquaculture; ESP; Reading Comprehension; Vocational Education

Introduction

Reading comprehension is a crucial skill in vocational education, as students are required to understand technical documents, procedural texts, and field-specific reports related to their area of specialization. In this context, reading is not merely a language activity but also a professional competency that supports workplace readiness. However, many vocational students still experience difficulties in reading comprehension, particularly when they are exposed to general English materials that do not reflect their disciplinary needs (Smith & Lee, 2022; Zhang & Wang, 2023).

In vocational programs such as Brackish and Marine Aquaculture Agribusiness, students are expected to comprehend texts related to water quality management, feeding systems, hatchery operations, and production data. These texts contain specialized vocabulary and concepts that require contextual understanding. When instructional materials are not aligned with such specific contexts, students tend to show low motivation and limited comprehension. This indicates a mismatch between the learning materials and the learners' academic and professional needs.

To address this issue, English for Specific Purposes (ESP) has been widely recognized as an appropriate approach in vocational education. ESP materials are designed to integrate discipline-specific vocabulary, authentic texts, and meaningful tasks that reflect real-world applications. (Hyland, 2022) emphasizes that ESP instruction should be grounded in authentic disciplinary discourse, while (Tardy, 2024) argues that contextualized materials enhance learner engagement and comprehension because students perceive them as relevant to their future careers. Therefore, ESP-based reading materials have the potential to improve both students' motivation and comprehension in vocational contexts.

In addition to relevance, the effectiveness of instructional materials also depends on how they are systematically designed. The ADDIE model—Analysis, Design, Development, Implementation, and Evaluation—provides a structured framework for developing instructional materials that are aligned with learners' needs and learning objectives. (Brown and Green, 2023) explain that ADDIE ensures coherence between content, pedagogy, and assessment, while its application in ESP contexts enables the development of materials that are both pedagogically sound and vocationally relevant (Alvarez, Suhartono, & Johnson, 2022).

Previous studies have demonstrated the positive impact of ESP-based materials on students' reading comprehension. (Iswari and Sari, 2023) found that vocational students who used contextualized ESP materials achieved higher reading performance and showed increased confidence compared to those using general English textbooks. Similarly, (Negash, 2025) reported significant improvements in students' comprehension scores after the implementation of discipline-specific reading materials in agricultural vocational schools. These findings suggest that ESP-based materials are effective in enhancing reading comprehension when they are aligned with students' fields of study.

However, despite the growing body of research on ESP and instructional design, there is still a lack of studies that specifically examine the integration of systematically developed ESP-based reading materials—particularly those designed using the ADDIE model—in aquaculture-related vocational programs. Most previous studies focus either on general vocational contexts or on ESP materials without clearly emphasizing the role of structured instructional design in their development. Moreover, limited research has investigated how such materials affect students' reading comprehension in specialized fields such as brackish and marine aquaculture agribusiness.

Therefore, this study aims to fill this gap by investigating the impact of ADDIE-based ESP reading materials on vocational students' reading comprehension, particularly in the context of aquaculture education. By combining ESP principles with a systematic instructional design framework, this study is expected to provide a more comprehensive understanding of how contextualized and well-designed materials can enhance students' reading skills.

Literature Review

Reading Comprehension in Vocational Education

Reading comprehension is generally defined as the ability to construct meaning from texts through an interactive process involving linguistic knowledge, cognitive strategies, and prior experience. It requires readers to actively engage with texts by predicting, questioning, summarizing, and making inferences (Snow, 2022). In educational contexts, this skill is fundamental for accessing knowledge and developing higher-order thinking skills.

In vocational education, however, reading comprehension extends beyond general literacy. Students are required to interpret technical documents, procedural texts, and discipline-specific information relevant to their fields. As noted by Zhang and Wang (2023), vocational literacy involves the integration of language proficiency and occupational knowledge, making reading a domain-specific competency rather than a purely linguistic skill.

Despite its importance, research consistently shows that vocational students face significant challenges in reading English texts. These difficulties are often linked to unfamiliar technical vocabulary, complex structures, and limited exposure to relevant materials (Smith & Lee, 2022). Moreover, students frequently rely on word-by-word translation strategies, which hinder global comprehension. Rahman and Santosa (2024) further argue that the use of non-contextualized materials reduces student engagement, as learners struggle to see the relevance of reading tasks to their future careers.

Several studies emphasize that contextualized and authentic materials can address these challenges. Negash (2025) highlights that exposure to workplace-related texts enhances both comprehension and professional communication skills, while Nguyen and Pham (2023) demonstrate that repeated exposure to field-specific vocabulary improves vocabulary acquisition and text understanding.

However, most of these studies focus primarily on the outcomes of contextualized materials without sufficiently examining how such materials are systematically designed or implemented in instructional settings. This suggests the need to explore not only *what* materials are effective but also *how* they are developed and delivered.

English for Specific Purposes (ESP)

English for Specific Purposes (ESP) is an approach that tailors language instruction to learners' academic or professional needs. Unlike general English, ESP emphasizes discipline-specific vocabulary, authentic discourse, and communicative practices relevant to real-world contexts (Hyland, 2022; Bhatia, 2025; Johns, 2012). A central principle of ESP is *needs analysis*, which ensures that instructional content aligns with learners' target situations (Hyland, 2009; Salmani-Nodoushan, 2020; Dou, Chan, & Win, 2023).

Another key feature of ESP is contextualized learning, where language is taught through authentic tasks and materials. Widodo (2016) and Tardy (2024) argue that such contextualization enhances learner motivation and engagement, as students perceive a clear connection between classroom learning and future professional use. ESP also supports the development of professional literacy, enabling learners to interpret and produce discipline-specific texts (Hirvela, 2012; Woodrow, 2022).

Empirical studies confirm the effectiveness of ESP in improving language outcomes. For example, Iswari and Sari (2023) and Ananta and Sholahuddin (2025) report that ESP-based materials significantly enhance students' reading comprehension, engagement, and confidence.

Nevertheless, existing studies tend to emphasize ESP as an approach while paying less attention to the instructional design processes used to develop ESP materials. As a result, there is limited discussion on how ESP principles can be systematically operationalized into effective teaching materials.

Instructional Material Development and the ADDIE Model

Effective instructional materials require systematic design to ensure alignment between learning objectives, content, and assessment. The ADDIE model—Analysis, Design, Development, Implementation, and Evaluation—provides a structured framework for achieving this alignment (Brown & Green, 2023).

In ESP contexts, the ADDIE model is particularly relevant because it begins with needs analysis and ends with evaluation and refinement. Alvarez, Suhartono, and Johnson (2022) argue that this model enables educators to develop materials that are both pedagogically sound and contextually relevant. Each stage contributes to material quality: analysis identifies learner needs, design structures learning activities, development produces materials, and implementation tests their effectiveness.

Despite its widespread use, research on ADDIE in language education often focuses on general instructional design rather than its integration with ESP. There is still limited empirical evidence demonstrating how ADDIE-based ESP materials specifically influence learning outcomes, particularly in vocational reading contexts. This indicates a gap between instructional design theory and ESP practice.

The Impact of ESP-Based Materials on Reading Comprehension

A growing body of research highlights the positive impact of ESP-based and contextualized materials on reading comprehension. These materials improve comprehension by increasing relevance, familiarity, and cognitive engagement. Zhang and Wang (2023) show that students exposed to field-related texts achieve higher comprehension accuracy, while Wang, Ma, and Vivian (2024) find that contextualized materials promote vocabulary acquisition through meaningful exposure.

In addition to cognitive benefits, contextualized materials also influence affective factors. Liu, Hamid, and Bao (2025) report that relevant materials enhance motivation and engagement, which in turn contribute to better learning outcomes. Similarly, Negash (2025) and Iswari and Sari (2023) demonstrate that ESP-based instruction improves students' reading performance, confidence, and participation.

However, most of these studies examine ESP materials in general contexts without focusing on specific vocational fields such as aquaculture. Furthermore, few studies combine ESP with a systematic instructional design model like ADDIE to evaluate its effectiveness in a structured manner. As a result, there is limited understanding of how well-designed ESP materials function in specialized vocational programs.

Synthesis and Research Gap

Overall, previous studies agree that:

1. Reading comprehension in vocational education requires contextualized and discipline-specific materials.
2. ESP provides an effective framework for aligning language learning with professional needs.
3. Contextualized materials improve comprehension, vocabulary, and motivation.

However, critical gaps remain:

- a. Most studies focus on *outcomes* rather than *development processes* of materials.

- b. Limited research integrates ESP with systematic instructional design models such as ADDIE.
- c. There is a lack of studies in highly specific vocational contexts, particularly brackish and marine aquaculture agribusiness.

Therefore, this study addresses these gaps by investigating the impact of ADDIE-based ESP reading materials on vocational students' reading comprehension in a specialized aquaculture context.

Methodology

This study employed a pre-experimental research design using a one-group pre-test and post-test design. According to Creswell and Creswell (2018), this design is commonly used in educational research to measure the effect of a treatment by comparing participants' performance before and after the intervention. The design can be illustrated as $O_1 - X - O_2$, where O_1 represents the pre-test, X represents the treatment, and O_2 represents the post-test. The pre-test was administered to measure students' initial level of reading comprehension before the implementation of the instructional treatment.

After the pre-test, the students received the treatment in the form of ESP-based reading materials designed to support vocational learning contexts. Following the treatment period, a post-test was conducted to measure students' reading comprehension after experiencing the instructional intervention. According to Ary, Jacobs, and Sorensen (2019), the comparison between pre-test and post-test scores in a one-group design allows researchers to determine whether the treatment has a measurable effect on participants' learning outcomes. Therefore, this design was used to examine the impact of ESP-based reading materials on students' reading comprehension achievement.

Participants

The participants were vocational students enrolled in the Brackish and Marine Aquaculture Agribusiness program. The sample consisted of one class selected through purposive sampling.

Research Instruments

The instruments used in this study consisted of a reading comprehension test and a student effectiveness questionnaire. The reading comprehension test was administered in the form of a pre-test and post-test to measure students' reading ability before and after the instructional treatment. According to Muhammad pour and Khalili Sabet (2024), reading comprehension tests are commonly used in ESP research to evaluate learners' understanding of texts and their ability to apply reading strategies in academic contexts. Similarly, Sola (2026) states that reading comprehension assessment should measure multiple aspects of reading such as identifying the main idea, interpreting vocabulary, and making inferences from the text.

The reading comprehension test in this study consisted of multiple-choice questions and short-answer questions. These question types are widely used in language assessment because they allow researchers to evaluate different levels of comprehension, including literal and inferential understanding. The test items focused on several key reading components, including main idea identification, vocabulary understanding, inference making, and technical interpretation of texts. According to Husna, Wahyuni, and Rukmini (2025), effective reading assessments should include tasks that measure students' ability to analyze vocabulary, identify main ideas, and interpret information within the context of the text.

In addition to the reading test, this study also used a student effectiveness questionnaire to examine learners' perceptions of the instructional materials. The questionnaire employed a Likert scale ranging from 1 to 5, allowing students to express their level of agreement with statements related to their learning improvement.

Questionnaires are commonly used in educational research to collect data about students' attitudes, motivation, and perceived learning outcomes. According to Oktavianti, Budiwati, and Prayogi (2026), Likert-scale questionnaires provide reliable data for evaluating students' attitudes toward reading activities and instructional materials in ESP classrooms.

Data Collection Procedure

1. Administering pre-test
2. Implementing ESP-based reading materials
3. Conducting post-test
4. Distributing effectiveness questionnaire

Data Analysis

Mean Score

To calculate the average score:

$$\bar{X} = \frac{\sum X}{N}$$

Where:

$\bar{X}$ = Mean score

$\sum X$ = Total score

N = Number of students

Gain Score

To determine improvement:

$$Gain = Post - test - Pre - test$$

Normalized Gain (g)

To measure effectiveness level:

$$g = \frac{Post - Pre}{100 - Pre}$$

Interpretation:

g value Category

≥ 0.7 High

0.3–0.7 Moderate

≤ 0.3 Low

Percentage Formula

For questionnaire data:

$$P = \frac{F}{N} \times 100\%$$

Where:

P = Percentage

F = Frequency

N = Total respondents

Hypothesis

H₀: There is no significant impact of ESP-based reading materials on vocational students' reading comprehension.

H₁: There is a significant impact of ESP-based reading materials on vocational students' reading comprehension.

Results

Students' Reading Comprehension Scores

The impact of ESP-based reading materials was measured by comparing students' pre-test and post-test scores.

Mean Score Calculation

The mean score was calculated using the formula:

$$\bar{X} = \frac{\sum X}{N}$$

Where:

$\bar{X}$ = Mean score

$\sum X$ = Total score

N = Number of students

Pre-test Result

Total score (Pre-test) = 1550

Number of students = 25

$$\bar{X}_{pre} = \frac{1550}{25} = 62$$

Mean pre-test score = **62**

This indicates that students' initial reading comprehension level was moderate and still below the expected competency standard.

Post-test Result

Total score (Post-test) = 2025

Number of students = 25

$$\bar{X}_{post} = \frac{2025}{25} = 81$$

Mean post-test score = **81**

This shows a considerable improvement after the implementation of ESP-based reading materials.

Gain Score Analysis

To determine improvement:

$$\begin{aligned} \text{Gain} &= \text{Post} - \text{Pre} \\ \text{Gain} &= 81 - 62 = 19 \end{aligned}$$

The students' mean score increased by **19 points**, indicating a significant improvement.

Normalized Gain (g)

To measure effectiveness level:

$$\begin{aligned} g &= \frac{\text{Post} - \text{Pre}}{100 - \text{Pre}} \\ g &= \frac{81 - 62}{100 - 62} \\ g &= \frac{19}{38} = 0.5 \end{aligned}$$

Interpretation:

g value Category

≥ 0.7 High

0.3–0.7 Moderate

≤ 0.3 Low

The normalized gain score of **0.5** falls into the **moderate category**, indicating that the ESP-based materials were effective in improving reading comprehension.

Student Effectiveness Questionnaire

The effectiveness questionnaire used a 5-point Likert scale.

The mean was calculated using:

$$\bar{X} = \frac{\sum X}{N}$$

The overall mean score from the questionnaire was **4.3**.

Interpretation:

Mean	Category
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4.21–5.00	Very Effective
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3.41–4.20	Effective
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2.61–3.40	Fair
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≤2.60	Low
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Since the mean was **4.3**, the materials were categorized as **Very Effective**.

Students reported that:

1. The materials were relevant to aquaculture contexts
2. Technical vocabulary became easier to understand
3. They felt more confident reading English texts

Discussion

The findings of this study demonstrate that ESP-based reading materials have a positive impact on vocational students' reading comprehension. The observed improvement in students' performance indicates that instructional materials aligned with learners' vocational contexts can effectively facilitate comprehension. Rather than merely reflecting score increases, this improvement suggests that contextualized materials enable students to process language more meaningfully by connecting new information with their existing knowledge. As argued by Yan (2025), ESP learning environments that integrate relevant content support more efficient language processing because learners engage with familiar and purposeful material.

This result is consistent with previous studies highlighting the importance of contextualization in vocational education. Zhang and Wang (2023) found that students who engage with discipline-specific texts demonstrate higher comprehension accuracy, primarily because familiarity with content reduces misinterpretation. Similarly, Negash (2025) emphasizes that authentic, profession-related materials enhance students' ability to apply reading strategies effectively. These findings reinforce the argument that the effectiveness of reading instruction is not solely determined by linguistic difficulty but also by the relevance of the content to learners' fields of study.

From a cognitive perspective, the improvement can be explained through the activation of prior knowledge. When students read texts related to aquaculture—such as water quality reports or feeding procedures—they are not encountering entirely new concepts, but rather integrating language with knowledge they already possess. Wang et al. (2024) explain that such contextualization reduces cognitive load, allowing learners to focus more on comprehension processes than on decoding unfamiliar content. This suggests that ESP-based materials function not only as language learning tools but also as cognitive supports that facilitate deeper understanding.

In addition to cognitive factors, affective aspects also play a significant role in the effectiveness of ESP-based materials. The high level of student approval reflected in the questionnaire results indicates that learners perceived the materials as relevant and beneficial. This aligns with the findings of Iswari and Sari (2023), who reported that ESP materials increase learners' confidence and classroom engagement. When

students recognize the practical value of what they are learning, they are more likely to participate actively and invest effort in the learning process.

Furthermore, the findings support Hyland's (2022) view that ESP instruction should incorporate discipline-specific vocabulary and authentic discourse to develop professional literacy. By engaging with aquaculture-related texts, students were not only improving their reading comprehension but also becoming familiar with the types of language and communication patterns used in their future professions. This indicates that ESP-based reading instruction contributes to both linguistic competence and vocational readiness, making it particularly suitable for vocational education contexts.

However, while the results indicate moderate effectiveness, this also suggests that there is still room for improvement. The moderate gain implies that although the materials were beneficial, they may not have fully addressed all learners' needs. Factors such as limited instructional time, varying levels of student proficiency, or the depth of material design may have influenced the overall effectiveness. This highlights the importance of continuous refinement of instructional materials, particularly through systematic frameworks such as ADDIE, to ensure optimal learning outcomes.

Overall, this study demonstrates that the effectiveness of ESP-based reading materials lies in their ability to integrate contextual relevance, cognitive support, and learner engagement. Unlike general English materials, ESP-based instruction provides meaningful learning experiences that connect language with professional knowledge. Therefore, the findings suggest that incorporating systematically designed, context-specific materials is a crucial strategy for improving reading comprehension and supporting vocational students' academic and professional development.

Conclusion

This study aimed to examine the impact of English for Specific Purposes (ESP)-based reading materials on vocational students' reading comprehension in the Brackish and Marine Aquaculture Agribusiness program. The findings indicate that the implementation of ESP-based materials led to a meaningful improvement in students' reading comprehension, as reflected in the increased post-test performance and moderate learning gain. This suggests that contextualized instructional materials effectively support students in understanding technical texts and discipline-specific vocabulary.

In addition, students' positive perceptions of the materials confirm that relevance to vocational contexts enhances both comprehension and learning motivation. By integrating authentic content and field-related topics, ESP-based materials enable students to connect language learning with their prior knowledge and professional needs.

Practically, these findings imply that:

1. **Teachers** should design or adapt reading materials that incorporate vocational content and authentic texts relevant to students' fields of study.
2. **Curriculum developers** should integrate ESP principles into vocational English programs to ensure alignment between language instruction and occupational demands.
3. **Educational institutions** should support the use of systematic instructional design models, such as ADDIE, to develop effective and context-specific learning materials.

Overall, this study highlights that ESP-based reading instruction is an effective approach for improving vocational students' reading comprehension while simultaneously preparing them for real-world professional communication.

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