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SUSTAINABLE AQUACULTURE PRACTICES OF GRADE 10 TLE LEARNERS OF BOLINAO SCHOOL OF FISHERIES

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Abstract : This study explores the perceptions and attitudes of Grade 10 Technology and Livelihood Education (TLE) learners from Bolinao School of Fisheries regarding sustainable aquaculture practices. A correlational research design was used to examine the relationship between learners' perceptions and attitudes and their demographic profiles. Cluster sampling was employed, with 42 students participating, and data were gathered through a custom-designed questionnaire. Analysis techniques included Pearson's r, Spearman's rho, and Chi-square tests. Findings show that the students possess a high level of understanding and commitment to sustainable aquaculture, indicated by a mean perception score of 4.26 ("High") and an attitude score of 4.51 ("Very High"). Learners demonstrated strong enthusiasm for adopting sustainable practices, showed openness to innovation, and expressed a sense of responsibility for environmental stewardship. While most demographic factors, such as age and gender, showed no significant correlation with perceptions and attitudes, parental occupation and home proximity to water bodies were found to influence students' attitudes significantly. A positive correlation ($r = 0.652$, $p < 0.01$) between perception and attitude was also observed, indicating that a greater understanding of sustainability positively impacts student attitudes. The study recommends enhancing sustainability education through experiential learning and engagement with local communities to deepen further students' knowledge and commitment to sustainable aquaculture practices.

IndexTerms - Sustainable, aquaculture, practices, Grade 10 learners, TVL

I. INTRODUCTION

1.1 Rationale

Aquaculture is the food production operation with the fastest rate of growth in the world, with the most significant potential to meet the rising demand for seafood and provide a solution to excessive fishing. Aquaculture has many advantages, but the quick expansion and intensification of production have sparked worries about fish welfare, food safety, and environmental and social difficulties resulting from the tragedy of the commons. To promote the development of aquaculture sustainably, these issues must be resolved (Xuan et al., 2021).

This study aimed to assess the students' perceptions and attitudes towards sustainable aquaculture practices. The results will offer insightful information on students' present knowledge and comprehension of sustainable aquaculture in the area. The long-term survival of this significant industry can be ensured by using the information to create educational efforts and programs that support sustainable aquaculture practices. Comprehending these perspectives can yield significant insights for educators and policymakers in formulating practical approaches to foster sustainable cultivation and consumption. The results of this investigation can guide the creation of educational initiatives that successfully foster students' comprehension and admiration of sustainable aquaculture techniques.

1.2 Theoretical framework

One of the most relevant theories is the Sustainability Framework by Goodland (1995), which emphasizes the need to balance ecological, economic, and social dimensions of development. In this context, sustainable aquaculture practices should focus on the economic benefits of fish farming and ensure that environmental integrity is maintained and that local communities, including learners, are socially empowered through education and skills development (Goodland, 1995). This framework ensures that the

students' learning outcomes align with sustainability principles, fostering both environmental responsibility and practical skill-building.

Another important framework is the Experiential Learning Theory by Kolb (1984), which posits that learning is a process where knowledge is created through the transformation of experience. In the case of aquaculture education, learners can engage in hands-on activities, such as fish farming, which allows them to directly apply theoretical knowledge to real-world situations. Kolb's theory supports the idea that students of the Bolinao School of Fisheries can develop a deeper understanding of sustainable aquaculture by engaging in activities that encourage reflection, experimentation, and practical application (Kolb, 1984). This aligns with the technical-vocational focus of their curriculum, ensuring that students not only learn but also develop competencies necessary for sustainable aquaculture practices.

Lastly, the Ecological Modernization Theory developed by Mol and Spaargaren (2000) provides a useful framework for understanding how technological advancements and modern practices can be integrated into traditional aquaculture systems to make them more sustainable. This theory suggests that technological innovations, when used responsibly, can mitigate environmental impacts and create more efficient aquaculture systems. By incorporating this theory, educators can teach learners how to adopt modern tools and techniques in a way that aligns with ecological sustainability, preparing them to contribute to both the local economy and environmental conservation (Mol & Spaargaren, 2000).

1.3 Conceptual Framework

The conceptual framework for this study is anchored on the Independent-Dependent Variable (IV-DV) model, which outlines the relationships between the socio-demographic characteristics of the learners (independent variables) and their perceptions and attitudes toward sustainable aquaculture practices (dependent variables). The independent variables include the profile of the respondents, precisely their age, sex, number of siblings, parents' highest educational attainment, parents' occupation, and house proximity. These factors are considered significant in shaping how learners perceive and approach sustainable aquaculture practices. For instance, a learner's age may influence their level of maturity and understanding of sustainability concepts, while gender might play a role due to cultural expectations and societal roles. Similarly, the number of siblings may impact how much responsibility a learner takes in household or community activities, including aquaculture, which could shape their views on sustainability.

In addition, the parent's educational attainment and occupation are hypothesized to have a direct impact on the learner's attitude. Parents with higher education may be more aware of environmental and sustainability issues, potentially passing on these values to their children. Likewise, if parents are involved in aquaculture or related fields, their occupation might influence their children's familiarity with and attitude toward sustainable practices. House proximity to aquaculture sites is another critical factor, as learners who live closer to these areas may have more hands-on experience or exposure, affecting their perceptions and engagement with sustainable aquaculture.

The dependent variables in this study focus on the learners' perceptions and attitudes towards sustainable aquaculture practices. These perceptions reflect how students view the importance of sustainability in aquaculture, including environmental, social, and economic aspects. At the same time, their attitudes capture their willingness and sense of responsibility in adopting sustainable practices. The framework helps examine whether there is a significant relationship between the learners' profiles and their perceptions and attitudes, such as whether older students or those with educated parents have a more positive attitude toward sustainability. Furthermore, the framework also explores whether there are significant differences in perceptions and attitudes among respondents, which could indicate the need for differentiated educational approaches to promoting sustainable aquaculture practices.

1.4 Statement of the Problem

This study aimed to determine the sustainable aquaculture practices of Grade 10 TLE Learners of Bolinao School of Fisheries. Specifically, it seeks to answer the following questions:

1. What is the profile of the respondents in terms of:
   - 1.1 age;
   - 1.2 sex;
   - 1.3 number of siblings;
   - 1.4 parents' highest educational attainment;
   - 1.5 parents' occupation; and
   - 1.6 house proximity?
2. What are the respondents' perceptions and attitudes towards sustainable aquaculture practices?
3. Is there a significant relationship between the profile and respondents' perceptions and attitudes towards sustainable aquaculture practices?
4. Is there a significant relationship between the respondents' perceptions and attitudes towards sustainable aquaculture practices?
5. What are the recommendations and actions based on the findings of the study?

1.5 Null Hyphothesis

In line with the sub-problems, this study tested the hypothesis in its null form at alpha level 0.05.

1. There is no significant relationship between the perceptions and attitudes towards sustainable aquaculture practices and the profile of respondents.
2. There is no significant relationship between the perceptions and attitudes of the respondents towards sustainable aquaculture practices.

1.6 Scope and Delimitation of the Study

The scope of this study focused on the sustainable aquaculture practices of Grade 10 learners enrolled in the Technical-Vocational-Livelihood (TLE) program at Bolinao School of Fisheries. Specifically, it aimed to explore the perceptions and attitudes of these students towards sustainable aquaculture. The research delves into the personal profiles of the respondents, which include factors such as age, sex, number of siblings, parents' educational attainment, parents' occupation, and the proximity of their homes to the school. These variables are examined to determine if they have any relationship with the learners' understanding and attitudes toward sustainable aquaculture.

In terms of delimitation, this study is limited to the Grade 10 TLE learners of Bolinao School of Fisheries, excluding learners from other grade levels and schools. The study confined its investigation to students' perceptions and attitudes toward sustainable aquaculture practices and does not cover other aspects of the aquaculture curriculum, such as technical skills or practical application. Additionally, the study did not account for other external factors like environmental policies or the socio-economic conditions of the community, which may also influence the learners' views. This focus ensures a targeted approach to understanding the specific factors that may shape the learners' attitudes and perceptions about sustainability in aquaculture.

1.7 Significance of the Study

The following shows how the results of the study are beneficial to the participants and the stakeholders.

School Administrators. The findings provide insights into the effectiveness of the current aquaculture curriculum and instructional methods. By understanding learners' perceptions and attitudes, administrators can evaluate whether the program aligns with the goals of sustainability and the needs of the community. These results may guide them in making informed decisions about future improvements in curriculum design, resource allocation, and partnerships with external stakeholders to strengthen sustainable practices within the school.

Teachers. The results serve as a foundation for tailoring their teaching strategies to better address the learners' perceptions and attitudes towards sustainability in aquaculture. The study can help teachers identify areas where students may need additional support, whether in technical skills or in fostering a deeper understanding of environmental responsibility. It also provides an opportunity to reflect on current teaching methodologies and enhance them to promote a more impactful learning experience.

Learners. The research highlights their role in sustainable aquaculture practices and how their background may influence their attitudes toward environmental sustainability. By engaging in the study, learners become more aware of the importance of their contributions to sustainable fisheries and the environment. This awareness could inspire a stronger commitment to responsible practices in both their academic pursuits and future careers.

Researchers. The study adds to the body of knowledge on education for sustainability, particularly in aquaculture. It presents a clear picture of how perceptions and attitudes are shaped by personal and socio-demographic factors. The findings may serve as a reference point for future studies that aim to explore the link between education, sustainability, and community development, especially within coastal and agricultural regions.

Stakeholders. The results shed light on the attitudes of future professionals in aquaculture. Understanding the learners' views can help stakeholders develop targeted initiatives, such as workshops or campaigns, that reinforce sustainable practices. Additionally, these findings encourage collaboration between schools and the industry to support the development of a responsible and environmentally conscious workforce.

Parents. The study emphasizes the influence of home environments on their children's attitudes toward sustainability. By recognizing their crucial role, parents may be encouraged to engage more actively in promoting sustainable practices at home, fostering an educational environment that aligns with the values of the school and the community.

Future Researchers. The study provides a basis for further exploration into sustainable education and aquaculture practices. It opens opportunities to examine different dimensions of sustainability, such as economic, social, and environmental impacts, and how these are integrated into educational programs. Future studies can build on these results to explore long-term outcomes of sustainable education or expand the scope to include more diverse learner populations.

1.8 Definition of Terms

Sustainable. It refers to the ability to maintain or continue a process or activity over time without causing depletion or harm to the environment (Cambridge Dictionary, 2024). In this study, "sustainable" refers to the practices in aquaculture that the Grade 10 learners identify as environmentally responsible, allowing for long-term viability and minimal ecological damage.

Aquaculture. It is the farming of aquatic organisms such as fish, shellfish, and plants in controlled environments (Food and Agriculture Organization, 2020). In this study, aquaculture refers specifically to the techniques and methods taught to Grade 10 learners at Bolinao School of Fisheries for raising and managing aquatic species sustainably.

Practices. It refer to repeated or customary actions or behaviors, especially as part of a profession or skill (Oxford Learner's Dictionary, 2024). In this study, "practices" denote the specific activities and techniques the learners engage in as part of their aquaculture training, particularly those aligned with sustainable principles.

Grade 10 Learners. It refers to students who are in their tenth year of formal schooling, typically aged 15 to 16 years (DepEd, 2016). In this study, Grade 10 learners refer to the students enrolled in the TVL program of Bolinao School of Fisheries, who are being trained in aquaculture and related subjects.

Technological and Livelihood Education (TLE). It refers to an educational track in the Philippines under the K-12 program that focuses on practical skills and technical knowledge necessary for vocational and livelihood opportunities (DepEd, 2013). In this study, TLE refers to the specialized education program that equips Grade 10 learners with technical skills in aquaculture, particularly sustainable practices relevant to local industries.

Perception. It is how something is regarded, understood, or interpreted by an individual (Merriam-Webster, 2024). In this study, perception refers to how the learners view and understand sustainable aquaculture practices, as influenced by their personal experiences and educational background.

Attitude. It refers to a settled way of thinking or feeling about something, typically reflected in behavior (American Psychological Association, 2020). In this study, attitude describes the learners' predispositions toward sustainable aquaculture practices, including their willingness to adopt and apply these practices in their education and future careers.

II. RESEARCH METHODOLOGY

This chapter discusses research methodology, which includes research design and the procedures used to solve research problems. Similarly, it discusses the data collection tools as well as the statistical treatments that will be used to analyze the data.

2.1 Research Design

In this study, the Descriptive Correlational research design is utilized. This design is used to describe the characteristics of the population under study and to examine potential relationships between variables (Creswell & Creswell, 2018). Specifically, the study aims to describe the learners' perceptions and attitudes toward sustainable aquaculture practices and explore whether there are significant relationships between the learners' profiles (age, sex, number of siblings, parents' educational attainment, etc.) and their perceptions and attitudes.

A Descriptive Correlational design is suitable because the study does not intend to manipulate any variables or establish cause-and-effect relationships but rather seeks to observe and describe naturally occurring phenomena (Gray, Grove, & Sutherland, 2017). The primary goal is to understand if certain demographic factors are related to how students view sustainable practices in aquaculture. This design helps in identifying trends and associations, which can provide meaningful insights for educators and administrators on how to better align the curriculum with the learners' backgrounds and experiences.

Furthermore, this design is appropriate for studies that involve real-world settings, as it allows the researcher to collect data on multiple variables and determine correlations without altering the educational environment (Polit & Beck, 2017).

2.2 Sources Data

The school is well-known in the district for offering specialized programs in aquaculture, aligning with the community's connection to coastal and fishing industries.

The school's teaching staff is composed of 28 dedicated teachers in the junior high school and 13 teachers in the senior high school. This diverse and skilled teaching force supports the learners in various disciplines, including the TLE (Technology and Livelihood Education) track, where the Grade 10 students involved in this study are enrolled. These educators are essential in delivering instruction on sustainable aquaculture practices, ensuring learners are equipped with both theoretical knowledge and practical skills.

Additionally, the school is supported by 16 non-teaching staff members who contribute to the smooth operation of the institution, providing administrative and logistical support. Their role ensures that the academic environment is conducive to learning, allowing both teachers and students to focus on educational goals.

2.3 Population Sampling

In this study, the researcher utilized the cluster sampling. Cluster sampling is a method where the population is divided into separate groups or clusters, and a random selection of clusters is chosen for the study. Data is collected from all or randomly selected individuals within these clusters. This technique is beneficial when the population is large and geographically spread out, reducing travel and logistical costs (Creswell & Creswell, 2023).

This study's population consists of Grade 10 TVL learners from the Bolinao School of Fisheries. Since class sections or other natural groupings likely organize these learners, cluster sampling becomes an efficient way to gather data without surveying every single learner in the school. By selecting specific sections or clusters of learners within the school, the researcher can gain a representative sample that reflects the larger population's perceptions and attitudes toward sustainable aquaculture practices.

This method is highly appropriate for this study because the Grade 10 learners enrolled in the TLE Aquaculture major are a defined and segmented group, making cluster sampling a suitable approach to ensure the data collected is manageable and meaningful (Taherdoost, 2020). Additionally, cluster sampling helps mitigate logistical challenges, such as time constraints and resource limitations, making it easier to handle the study within the given timeframe and resources available.

2.4 Instrumentation and Data Collection

This study employed a self-crafted questionnaire. This questionnaire was developed to gather detailed information regarding the learners' perceptions and attitudes towards sustainable aquaculture practices. By designing it specifically for this study, the researcher ensured that each item directly relates to the research questions, capturing critical insights into the learners' understanding, practices, and attitudes (Taherdoost, 2019). This customization allows for precise and relevant data collection, particularly in an educational setting where localized knowledge and practices are critical to understanding the learners' engagement with aquaculture.

To ensure the questionnaire's validity as a research instrument, it underwent a rigorous validation process by three subject matter experts. These experts evaluated the instrument using a 10-item validity questionnaire, which focused on different aspects of the questionnaire's design, such as clarity, relevance, coherence, and comprehensiveness of the items. The experts were selected based on their expertise in sustainable aquaculture, educational research, and assessment techniques, ensuring the instrument met academic and content-related standards (Almalki, 2020). This process of expert validation is crucial because it verifies that the questions are appropriate, accurately reflect the study's objectives, and are free from biases that could skew the data collection.

The 10-item validity questions likely covered aspects such as whether the questionnaire adequately measures perceptions and attitudes, whether the language is understandable to the Grade 10 learners, and whether the items are aligned with sustainable aquaculture practices. This step in the validation process strengthens the credibility of the data collected. It ensures the questionnaire is aligned with the research goals and is clear and appropriate for its target learners (Fraenkel et al., 2019).

Numerical value	Score Range	Description
5	4.51 – 5.00	Very High (VH)
4	3.51 – 4.50	High (H)
3	2.51 – 3.50	Moderate (M)
2	1.51 – 2.50	Low (L)
1	1.00 – 1.50	Very low (VL)

Moreover, to facilitate efficient data collection, the questionnaire was administered using Google Forms—a widely accessible online platform known for its user-friendly interface and efficient data management capabilities. By opting for an online format, the researchers overcame geographical barriers and reached a wider pool of potential respondents, thereby enhancing the study's scope and representativeness.

2.5 Tools for Data Analysis

The data underwent a rigorous analysis employing appropriate statistical methods through IBM SPSS Statistics 20 to derive valuable insights and make significant discoveries. This process ensured the precision of the results in accurately portraying the actual situation and providing solutions to the research's addressed concerns.

To answer sub-problem 1, the profile of the respondents, frequency counts, and percentages were used.

To answer sub-problems 2 and 3, the respondents' perceptions and attitudes towards sustainable aquaculture practices, the weighted mean was computed and described using a five-point Likert scale with a descriptive equivalent shown below:

Score	Median Score Range	Descriptive Equivalents
5	4.51 – 5.00	Very High (VH)
4	3.51 – 4.49	High (H)
3	2.51 – 3.49	Moderate (M)
2	1.51 – 2.49	Low (L)
1	1.00 – 1.49	Very Low (VL)

To answer sub-problem 4, the test to determine whether there is a significant relationship between respondents' perceptions and attitudes towards sustainable aquaculture practices and their profiles, Pearson-R, Point Biserial, Chi-Suare Test, and Spearman Rank were utilized.

To answer sub-problem 5, Pearson-R was utilized to test whether there is a significant relationship between the respondents' perceptions and attitudes towards sustainable aquaculture practices.

III. RESULTS AND DISCUSSION

This chapter presents the study's results based on the gathered, analyzed, and interpreted data. The results are arranged according to the order of the problems stated in the previous chapter.

3.1 Test of Relationship Between the Profile and Respondents' Perceptions and Attitudes on Sustainable Aquaculture Practices

Table 1. Relationship Between the Profile and Respondents' Perceptions and Attitudes on Sustainable Aquaculture Practices

	Perception		Attitude	
Profile	**Statistics**	**p-value**	**Statistics**	**p-value**
Age[a]	**-0.178**	**0.259**	**-0.020**	**0,901**
Sex[b]	**-0.016**	**0.227**	**0.078**	**0.624**
Number of Siblings[a]	**-0.063**	**0.098**	**0.098**	**0.537**
Parents Highest Educational Attainment[c]	**0.215**	**0.172**	**-0.020**	**0.898**
Parents Occupation[d]	**20.214[a]**	**0.254**	**26.822[a]**	**0.031**
House Proximity[d]	**30.283[a]**	**0.350**	**36.921[a]**	**0.045**

[**]Correlation is significant at the 0.01 level (2-tailed)

[a]Pearson-r; [b]Point Biserial Correlation; [c]Spearman – Rho; [d]Chi-Square

Table 1 reveals that the correlation between respondents' profiles and their perceptions and attitudes toward sustainable aquaculture practices is statistically varied. Specifically, no demographic factors—age, sex, and the number of siblings—significantly correlate with the student's perception or attitude toward sustainable aquaculture, as indicated by high p-values ($p > 0.05$). This finding suggests that demographic factors may not directly influence how Grade 10 TLE learners at Bolinao School of Fisheries perceive or feel about sustainable aquaculture. Studies have found that while age and family size sometimes affect environmental attitudes in general (Pallant, 2021), other factors may have more relevance in the context of specific practices such as sustainable aquaculture. Parents' highest educational attainment shows a slight positive correlation with perception ($r = 0.215$,

p > 0.05). However, it is not statistically significant, hinting at the potential influence of educational background in shaping early environmental perceptions, as seen in related research on youth attitudes toward environmental stewardship (Cruz et al., 2019).

The relationship between parental occupation, the proximity of students' homes to coastal areas, and students' attitudes toward sustainable aquaculture demonstrates a more substantial connection. Parental occupation (Chi-square = 26.822, p = 0.031) and house proximity (Chi-square = 36.921, p = 0.045) are significantly related to the students' attitudes, implying that both parents' involvement in fisheries-related occupations and proximity to aquaculture sites may foster more vital environmental responsibility or awareness (Gonzalez, 2020). This aligns with the concept that direct exposure to environmental practices or occupation-linked knowledge may shape positive attitudes toward sustainability (Sarmiento & Lim, 2022). Overall, the data underscores how external environmental and familial factors could play a role in influencing students' engagement with sustainable practices, even if demographic factors alone do not fully explain their perspectives.

3.2 Test of Relationship Between the Respondents' Perceptions and Attitudes on Sustainable Aquaculture Practices

Table 2. Tests of Relationship between Perceptions and Attitudes on Sustainable Aquaculture Practices of Grade 10 TLE Learners

Perception on Sustainable Aquaculture Practices	**Attitude on Sustainable Aquaculture Practices**	
	Statistics	**0.652**
	p-value	**0.000**

****Correlation is significant at the 0.01 level (2-tailed)**

Table 2 reveals a significant relationship between Grade 10 TLE learners' perceptions and attitudes toward sustainable aquaculture practices, with a correlation coefficient of 0.652 and a p-value of 0.000. This high correlation suggests that as students' understanding and awareness of sustainable aquaculture practices increase, their positive attitudes towards these practices also tend to strengthen. Such findings align with previous research indicating that perception is often a strong predictor of attitude, particularly in environmental education contexts (Jorgenson & Shultz, 2021). This correlation suggests that fostering a clear understanding of sustainable aquaculture benefits can be instrumental in shaping positive attitudes among young learners, which is essential for cultivating responsible environmental behavior (Cruz et al., 2020).

The significance of this relationship highlights the importance of integrating knowledge-based learning into sustainable aquaculture education for young students. Studies have shown that students who develop a solid comprehension of sustainable practices are more likely to adopt and advocate for them (Ramos & Villanueva, 2019). Given this connection, it is evident that educational programs at Bolinao School of Fisheries, which emphasize sustainable practices in aquaculture, could enhance students' knowledge and foster their willingness to support sustainability initiatives actively. This supports the findings by Guerrero (2022), who observed that educational interventions in similar settings have led to positive shifts in attitudes toward environmental stewardship among youth. Thus, improving perception through targeted educational efforts can be crucial in shaping attitudes toward sustainable aquaculture practices.

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary, conclusions, and recommendations based on the gathered, analyzed, and interpreted results.

4.1 Summary

The study aimed to investigate the perception and attitude of Grade 10 TLE learners of Bolinao School of Fisheries on sustainable aquaculture practices.

The study pursued to test the following hypotheses in their null form at a 0.05 level of significance: There is no significant relationship between the perception and attitude and profile of Grade 10 TLE learners of Bolinao School of Fisheries on sustainable aquaculture practices.

This study used the correlational research design, which is appropriate for this study since it will describe the relationship between perception and attitude and profile of Grade 10 TLE learners of Bolinao School of Fisheries on sustainable aquaculture practices.

This study used the cluster sampling technique. Since the respondents were the 42 Grade 10 TLE learners of Bolinao School of Fisheries, it was appropriate to use this technique.

The study used a self-made questionnaire as the primary data collection instrument to gather information from the 42 Grade 10 TLE learners of Bolinao School of Fisheries.

The gathered data were collected, analyzed, and interpreted using frequency counts, percentages, average weighted mean, Pearson-R, Point-Biserial, Spearman rho, and Chi-square Test.

4.2 Conclusions

From the presented results, the following conclusions are drawn:

1. Students show a solid understanding of sustainable aquaculture and a positive attitude toward adopting these practices, reflecting the effectiveness of their environmental education.
2. High enthusiasm for learning about innovative technologies in aquaculture highlights a readiness to embrace advancements for sustainability.
3. Students recognize aquaculture's impact on global food security and climate resilience, emphasizing the importance of sustainability education.

4. Students value transparency and accountability in aquaculture, aligning with global demand for ethical, traceable seafood products.
5. Learners exhibit empathy towards communities impacted by unsustainable practices, showing an understanding of aquaculture's social implications.
6. The strong correlation between perceptions and attitudes confirms that sustainability education shapes both students' knowledge and commitment, fostering proactive environmental stewardship.

4.3 Recommendations

Based on the results of the study, the following recommendations are hereby presented:

1. To further cultivate awareness and positive attitudes, the school should consider expanding its curriculum on sustainable aquaculture practices, integrating more hands-on experiences like fieldwork or sustainable fishery projects to solidify students' commitment to environmental practices.
2. Given the students' interest in innovative technologies, it is recommended to incorporate workshops and collaborations with industry experts in sustainable aquaculture technology, allowing students to explore and apply new methods in a practical setting.
3. To deepen students' understanding of aquaculture's role in global issues, educators could incorporate case studies on food security and climate impacts. This approach will help students connect local practices with global sustainability goals.
4. Since students value transparency and accountability, the school could organize discussions or seminars on ethical aquaculture practices, bringing in professionals who can share insights on supply chain transparency and the importance of consumer trust.
5. To strengthen students' social awareness, the school could facilitate community outreach programs where students engage with local communities impacted by aquaculture practices. This will provide a real-world perspective on the social aspects of sustainable practices.
6. Recognizing the influence of education on attitudes, it is recommended that the school regularly evaluate and update its curriculum to ensure it remains aligned with current sustainability trends, reinforcing a positive mindset towards sustainable aquaculture.

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