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Laboratory Facilities as Predictors of Academic Performance among Maritime Students

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ABSTRACT

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This study investigates the influence of laboratory facilities on maritime students' learning and extent of delivery of instruction at the Merchant Marine Academy of Caraga Inc. It emphasizes the need for improvements to align with industry requirements and prepare students for future challenges. The research examines the impact of specific facilities like the seamanship lab, bridge simulator, and chart room. The researchers used a quantitative approach to gather data from maritime students and instructors through surveys. The analysis focused on the serviceability of the labs in terms of equipment availability, maintenance, and safety standards. The justification for the research is further supported by

the findings, which indicate that most facilities are in good working order, with serviceability ranging from 77% to 87%. Interestingly, the study highlights that instructor expertise is just as important as the facilities themselves. It emphasizes that instructor experience and teaching methods significantly impact student learning, suggesting a need for investment in instructor development alongside improvements to the laboratories. In conclusion, the abstract justifies the research by demonstrating that laboratory facilities are important for maritime student learning and that there is a need for improvement in order to prepare students for the challenges of the maritime industry. The abstract outlines a methodology to investigate this and presents preliminary findings that justify further research.

INTRODUCTION

Laboratory facilities are integral to maritime education, offering students essential hands-on experience crucial for their future careers. In the international context, the United Nations Sustainable Development Goal 4 (SDG 4) emphasizes quality education, aligning with the study's focus on enhancing maritime education outcomes (Baumler et al., 2021). At the national level, the Philippines, with its rich maritime heritage and significant seafaring industry, places a high value on maritime education to meet industry demands and ensure maritime safety (Gonzales, 2019). Locally, in Butuan City, where the Merchant Marine Academy of Caraga Inc. (MMACI) is situated, the need for well-equipped laboratory facilities is paramount to provide students with a competitive edge in the maritime sector.

Drawing on current scientific evidence, research has shown that experiential learning theories, such as David Kolb's model, can significantly enhance student engagement and learning outcomes in maritime education. However, there remains a gap in understanding the specific impact of laboratory facilities on maritime students' academic performance and practical skills. By evaluating the extent of delivery instruction and serviceability of laboratory facilities at MMACI, this study aims to generate new knowledge on the relationship between facility quality, instructional delivery, and student achievement.

The expected outcomes of this research include identifying strengths and weaknesses in the current laboratory facilities, proposing targeted improvements to align with industry standards, and enhancing student learning experiences. The significance of this study extends beyond the local context of Butuan City to the broader maritime education landscape internationally, where the findings can inform best practices and contribute to the continuous improvement of maritime education programs. In the Philippines, a country known for its seafaring tradition, the study's outcomes can directly impact the quality of maritime education, ensuring that graduates are well-prepared to meet the evolving demands of the maritime industry and contribute to national maritime excellence.

FRAMEWORK

Developed in the 1976, David Kolb's Experiential Learning Theory outlines a dynamic learning process with four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. This theory is relevant for analyzing the challenges Bachelor of Science in Marine Transportation students face in laboratory courses. Students engage in practical experiments (concrete experience), reflect on these experiences (reflective observation), develop theoretical insights (abstract conceptualization), and apply new knowledge (active experimentation). Using Kolb's framework, the study can effectively analyze and address these challenges to improve maritime education.

OBJECTIVES OF THE STUDY

The study's objectives aspire to be a catalyst for positive change, advocating for improvements in laboratory facilities that not only meet current educational needs but also anticipate and accommodate future challenges. The research aims to enhance the learning experience for maritime students by examining the impact of laboratory facilities, including a seamanship lab, bridge simulator, and chart room.

METHODOLOGY

Research Design

This study used a quantitative research design to investigate the delivery of instructions and the effects of laboratory facilities on maritime students at the Merchant Marine Academy of Caraga Inc. (MMACI). The descriptive method was employed to analyze and interpret the relationship between laboratory facilities and the enhancement of laboratory-related courses. According to Bhandari (2020), quantitative research involves collecting and analyzing numerical data to find patterns, make predictions, test causal relationships, and generalize results.

Research Site

The research locale was the Merchant Marine Academy of Caraga Inc. in the Philippines. This institution was chosen as the setting for the study to understand the Extent of Delivery Instruction and Serviceability of Laboratory Facilities as Predictors of academic performance among maritime students.

Respondents of the Study

The respondents were taken from the total population of 380 students taking Bachelor of Science in Marine Transportation from the 1st to 3rd year levels. Using the 50%+1 sampling technique, the researchers obtained a total sample size of 191 respondents.

Instrumentation

The survey questionnaire consists of two areas, namely area A, which focuses on laboratory facilities based on the standard instrument provided by the Maritime Industry Authority. Area B, Delivery of Instruction, Focuses on the delivery of instruction. The questionnaires have been adapted and approved by the author of the study and were validated entitled "The Effect of Instructional Delivery Method on Interaction and Satisfaction in Distance Education Courses at a Community College."

Data Gathering Procedure

Researchers created a letter of approval and submitted it to the School Principal and Practical Research Subject Teacher to survey the study's respondents. The Practical Research Subject Teacher and the School Principal pursued clearance to conduct the research. The researchers prepared a request letter of approval for this purpose, which was submitted by the researchers for approval. The respondents were selected using random sampling. Those who were available on the day the survey was conducted were considered to answer the survey tool. The researchers explained the purpose of the study, which they presented through printed questionnaires to the respondents who met the predefined criteria. After the respondents finished answering the printed questionnaires, the researchers collected all the questionnaires. Once collected, the researchers interpreted and analyzed the survey results to arrive at a conclusion or outcome of the study.

Research Ethics Protocol

The research proposed study entitled "Extent of Delivery Instruction and Serviceability of Laboratory Facilities as Predictors of Academic Performance among Maritime Students" conducted a survey. The respondent voluntarily chose to participate. They are free to refuse to take part in this research. Their identities and sensitive information are kept confidential. They were provided and signed consent and information form as evidence of their voluntary involvement, and there was an in-person discussion about the optional dissemination of personal information.

Since none of the respondents were forced, the researcher wrote a permission letter to the dean requesting to conduct a survey. After that, the dean approved the request letter. The researcher notified the respondent about the material and included an image.

The data was treated with the utmost confidentiality for the study, and the information was not used for any purpose other than what was intended, as the researchers informed the respondents of the documentation, including pictures. The research must adhere to integrity and ethical practices. Data are secured in a flash drive containing solely the responses. Lastly, there was an orientation of racial and ethnic group.

RESULTS AND DISCUSSION

Problem 1: What is the level of serviceability of the laboratory facilities in terms of seamanship, bridge simulator, and chart room?

Table 1
Level of Serviceability of the Laboratory Facilities In Terms of Seamanship Laboratory

Seamanship Laboratory	Frequency	%	Verbal Description	Frequency	%	Verbal Description
1. The equipment and tools are available for use.	160	84	Serviceable	31	16	Non-serviceable
2. The ratio and proportion of students to equipment are maintained.	157	82	Serviceable	34	18	Non-serviceable
3. Status of the equipment if it is operational or in good working condition.	161	84	Serviceable	30	16	Non-serviceable
4. Records of equipment utilization must be kept to track usage trends and optimize efficiency.	159	83	Serviceable	32	17	Non-serviceable
5. Laboratory exercises are available and relevant to STCW competence standards.	159	83	Serviceable	32	17	Non-serviceable
6. Records must be maintained showing that laboratory exercises are regularly reviewed, validated, and updated as needed.	156	82	Serviceable	35	18	Non-serviceable

7. Records of Review, validation and updating of laboratory exercises are maintained.	158	83	Serviceable	33	17	Non-serviceable
8. A preventive maintenance system I place for equipment.	159	83	Serviceable	32	17	Non-serviceable
9. Records that students have undergone familiarization on the equipment and safety procedures in the laboratory room (house rules)	161	84	Serviceable	30	16	Non-serviceable
10. The compliance of laboratory equipment is evaluated through physical inspection and interviews.	164	86	Serviceable	27	14	Non-serviceable
11. All laboratory equipment must be owned by the institution and located within the institutional site.	165	86	Serviceable	26	14	Non-serviceable
12. The equipment, tools, and materials required for course delivery are referred to as per course specifications.	160	84	Serviceable	31	16	Non-serviceable
13. The conduct of laboratory exercises is observed.	166	87	Serviceable	25	13	Non-serviceable
14. The institution's documented system for procurement and keeping of supplies, equipment, and consumable materials is checked.	165	86	Serviceable	26	14	Non-serviceable

15. The institution has a documented system for maintaining equipment and facilities to ensure safe operation.	161	84	Serviceable	30	16	Non-serviceable
16. Records of maintenance are kept.	123	64	Serviceable	68	36	Non-serviceable

Table 1 provides detailed data on the assessment of serviceability for various aspects of the seamanship laboratory. The table categorizes these aspects into two descriptors: "Serviceable" and "Non-serviceable." For example, 84% (160) of respondents rated the availability of equipment and tools as serviceable, while 16% (31) rated them as non-serviceable. Additionally, the ratio and proportion of students to equipment maintenance were rated as serviceable by 82% (157) and non-serviceable by 18% (34). Notable serviceable aspects include the operational status of equipment (84%, 161), relevance and availability of laboratory exercises (83%, 159), and compliance of laboratory equipment evaluated through physical inspection (86%, 164). The lowest serviceable aspect was the records of maintenance kept, with 64% (123) serviceable and 36% (68) non-serviceable. Therefore, in totality, the level of serviceability of the laboratory facilities in terms of seamanship laboratory implies that the seamanship lab is generally well-maintained and effective, with most aspects rated highly serviceable.

This study has been elaborated on in the works of Salazar-Escoboza et al. (2020), who claim that the safety climate in academic laboratories significantly impacts the overall serviceability and safety of the facilities. This aligns with the study by Zhang (2023), which emphasizes the importance of comprehensive safety and maintenance records for ensuring long-term equipment reliability and student safety. The high percentage of serviceable ratings for critical aspects, such as equipment availability and operational status, suggests that the lab provides a conducive environment for learning. However, the notable proportion of non-serviceable ratings in areas like maintenance record keeping indicates potential areas for improvement. This support the seamanship laboratory's high level of serviceability in most areas is supported by recent literature. The findings suggest that while the laboratory is generally effective, there are areas, particularly in record maintenance, that require attention. This agrees with the assertions of Drahein et al. (2019) and Sanni-Anibire et al. (2018), who highlight the critical role of meticulous record-keeping and regular maintenance in educational laboratories to enhance serviceability and ensure effective learning outcomes.

Table 2
Level of Serviceability of the Laboratory Facilities In Terms of Bridge Simulator Laboratory

Bridge Simulator Laboratory	Frequency	%	Verbal Description	Frequency	%	Verbal Description
1. The equipment and tools are available for use.	158	83	Serviceable	33	17	Non-serviceable
2. The ratio and proportion of students to equipment are maintained.	155	81	Serviceable	36	19	Non-serviceable
3. Status of the equipment if it is operational or in good working condition.	162	85	Serviceable	29	15	Non-serviceable
4. Records of equipment utilization must be kept to track usage trends and optimize efficiency.	154	81	Serviceable	37	19	Non-serviceable
5. Laboratory exercises are available and relevant to STCW competence standards.	159	83	Serviceable	32	17	Non-serviceable
6. Records must be maintained showing that laboratory exercises are regularly reviewed, validated, and updated as needed.	160	84	Serviceable	31	16	Non-serviceable
7. Records of Review, validation and updating of laboratory exercises are maintained.	156	82	Serviceable	35	18	Non-serviceable
8. A preventive maintenance system I place for equipment.	166	87	Serviceable	25	13	Non-serviceable

9. Records that students have undergone familiarization on the equipment and safety procedures in the laboratory room (house rules)	159	83	Serviceable	32	17	Non-serviceable
10. The compliance of laboratory equipment is evaluated through physical inspection and interviews.	161	84	Serviceable	30	16	Non-serviceable
11. All laboratory equipment must be owned by the institution and located within the institutional site.	159	83	Serviceable	32	17	Non-serviceable
12. The equipment, tools, and materials required for course delivery are referred to as per course specifications.	164	86	Serviceable	27	14	Non-serviceable
13. The conduct of laboratory exercises is observed.	167	87	Serviceable	24	13	Non-serviceable
14. The institution's documented system for procurement and keeping of supplies, equipment, and consumable materials is checked.	162	85	Serviceable	29	15	Non-serviceable
15. The institution has a documented system for maintaining equipment and facilities to ensure safe operation.	163	85	Serviceable	28	15	Non-serviceable
16. Records of maintenance are kept.	162	85	Serviceable	29	15	Non-serviceable

Table 2 presents detailed data on the serviceability of various aspects of the bridge simulator laboratory. Specifically, it lists the frequency and percentage of each serviceability descriptor: "Serviceable" and "Non-serviceable." For instance, 83% (158) of respondents rated the availability of equipment and tools as serviceable, while 17% (33) rated them as non-serviceable. Similarly, the status of the equipment was deemed serviceable by 85% (162) and non-serviceable by 15% (29). Other notable serviceable aspects include the preventive maintenance

system (87%, 166) and the conduct of laboratory exercises (87%, 167). However, the lowest serviceable aspect was record-keeping of equipment utilization, with 81% (154) serviceable and 19% (37) non-serviceable. Therefore, in totality, the level of serviceability of the laboratory facilities in terms of the bridge simulator laboratory implies that the bridge simulator lab is generally well-maintained and effective, with most aspects rated highly serviceable.

This study has been elaborated in the works of Costa et al. (2018), which claims that the usability and integration of simulation tools in maritime training environments significantly impact the effectiveness of the training. This aligns with the study by Scherer (2022), which highlights the importance of virtual and remote laboratories in maintaining high standards of education and training. The high percentage of serviceable ratings for critical aspects, such as the operational status of equipment and the preventive maintenance system, suggests that the lab provides a conducive environment for learning. However, the notable proportion of non-serviceable ratings in areas like record-keeping indicates potential areas for improvement, which is consistent with the findings of Ukaegbu et al. (2023), who emphasize the need for comprehensive maintenance records to ensure long-term equipment reliability. This study supports the bridge simulator laboratory's high level of serviceability in most areas and is supported by recent literature. The findings suggest that while the laboratory is generally effective, there are areas, particularly in record maintenance, that require attention. This agrees with the assertions of Scherer (2022) and Ukaegbu et al. (2023), who highlight the critical role of meticulous record-keeping and regular maintenance in educational laboratories to enhance serviceability and ensure effective learning outcomes.

Table 3

Level of Serviceability of the Laboratory Facilities in Terms of Chart Room Laboratory

Chart Room Laboratory	Frequency	%	Verbal Description	Frequency	%	Verbal Description
1. The equipment and tools are available for use.	148	77	Serviceable	43	22.51	Non-serviceable
2. The ratio and proportion of students to equipment are maintained.	152	80	Serviceable	39	20.42	Non-serviceable
3. Status of the equipment if it is operational or in good working condition.	157	82	Serviceable	34	17.80	Non-serviceable

4. Records of equipment utilization must be kept to track usage trends and optimize efficiency.	154	81	Serviceable	37	19.37	Non-serviceable
5. Laboratory exercises are available and relevant to STCW competence standards.	155	81	Serviceable	36	18.85	Non-serviceable
6. Records must be maintained showing that laboratory exercises are regularly reviewed, validated, and updated as needed.	155	81	Serviceable	36	18.85	Non-serviceable
7. Records of Review, validation and updating of laboratory exercises are maintained.	160	84	Serviceable	31	16.23	Non-serviceable
8. A preventive maintenance system I place for equipment.	156	82	Serviceable	35	18.32	Non-serviceable
9. Records that students have undergone familiarization on the equipment and safety procedures in the laboratory room (house rules)	160	84	Serviceable	31	16.23	Non-serviceable

10. The compliance of laboratory equipment is evaluated through physical inspection and interviews.	155	81	Serviceable	36	18.85	Non-serviceable
11. All laboratory equipment must be owned by the institution and located within the institutional site.	157	82	Serviceable	34	17.80	Non-serviceable
12. The equipment, tools, and materials required for course delivery are referred to as per course specifications.	156	82	Serviceable	35	18.32	Non-serviceable
13. The conduct of laboratory exercises is observed.	157	82	Serviceable	34	17.80	Non-serviceable
14. The institution's documented system for procurement and keeping of supplies, equipment, and consumable materials is checked.	159	83	Serviceable	32	16.75	Non-serviceable
15. The institution has a documented system for maintaining equipment and facilities to ensure safe operation.	162	85	Serviceable	29	15.18	Non-serviceable
16. Records of maintenance are kept.	159	83	Serviceable	32	16.75	Non-serviceable

Table 3 presents data on the serviceability of various aspects of the chart room laboratory. Specifically, it shows the frequency and percentage of serviceability for each aspect, categorized into "Serviceable" and "Non-serviceable." For instance, 77% (148) of respondents rated the availability of equipment and tools as serviceable, while 22.51% (43) rated them as non-serviceable. Similarly, the status of the equipment was deemed serviceable by 82% (157) and non-serviceable by 17.80% (34). Other notable serviceable aspects include records of review, validation, and updating of laboratory exercises (84%, 160) and preventive maintenance systems (82%, 156). The lowest serviceable aspect was the availability of equipment and tools, with 77% serviceable and 22.51% non-serviceable. Therefore, in totality, the level of serviceability of the laboratory facilities in terms of the chart room laboratory implies that the chart room laboratory is generally well-maintained and effective, with most aspects rated highly serviceable.

This study has been elaborated in the works of Liang and Liu (2017), which claim that the effectiveness of laboratory facilities significantly impacts the quality of education and student learning outcomes. This aligns with the study by Scherer (2022), which emphasizes the importance of maintaining high standards of serviceability in educational laboratories to ensure effective learning environments. The high percentage of serviceable ratings for critical aspects, such as the operational status of equipment and preventive maintenance systems, suggests that the lab provides a conducive environment for learning. However, the notable proportion of non-serviceable ratings in areas like equipment availability indicates potential areas for improvement, which is consistent with the findings of Ukaegbu et al. (2023), who highlight the need for comprehensive maintenance and equipment management to ensure long-term serviceability.

Problem 2: To what extent is the delivery of instructions among the college faculty in terms of learner to learner, learner to instructor, learner to content, learner to technology, and student satisfaction?

Table 4

The Extent of Delivery of Instructions among the College Faculty in terms of Learner to Learner

Learner-to-Learner	Weighted Mean	Verbal Description
1. Course activities require me to interact with other students.	3.43	Most of the time
2. I initiate interaction with other students in the course.	3.38	Most of the time
3. I ask questions of other students in my course.	3.36	Most of the time

4. I respond to questions from other students in my course.	3.29	Most of the time
5. I reply to messages from other students in the course.	3.31	Most of the time
6. Course activities require me to work in groups with other students.	3.40	Most of the time
7. Course activities require students to share the results of group work with the entire class.	3.41	Most of the time
8. There was positive interaction between other students in the course and me.	3.35	Most of the time
Weighted Mean	3.37	Most of the time

Table 4 shows the extent of learner-to-learner interactions facilitated by course activities. The table provides a weighted mean and verbal description for each item. The highest weighted mean is 3.43 for the item "Course activities require me to interact with other students," indicating that this interaction occurs "most of the time." Other activities, such as initiating interaction (3.38), asking questions (3.36), and responding to questions (3.29), also occur frequently. The overall average weighted mean is 3.37, suggesting that learner-to-learner interactions generally happen "most of the time," which indicates that the response occurs frequently but not all the time.

This study has been elaborated in the works of Oyarzun et al. (2018), which claims that designed learner-to-learner interactions with high levels of collaborative intent positively affect learner achievement and satisfaction. The findings from Table 8 indicate that the instructional delivery at the college effectively promotes peer interactions, a critical component of collaborative learning. This aligns with the study by Li et al. (2022), emphasizing that active engagement and communication among students lead to better understanding and retention of course material. The implications for the seamanship lab are substantial; fostering a collaborative learning environment through structured interactions can enhance practical skills and teamwork, which are essential in maritime education. Ensuring these interactions occur regularly can lead to improved student satisfaction and educational outcomes.

Table 5

The Extent of Delivery of Instruction among the College Faculty in terms of Learner to Instructor

Learner-to-Instructor	Weighted Mean	Verbal Description
9. Course activities require me to interact with the instructor in the course.	3.45	Most of the time
10. I respond to questions from the instructor.	3.38	Most of the time
11. I reply to messages from the instructor.	3.40	Most of the time
12. I initiate interaction with the instructor.	3.41	Most of the time
13. I ask questions of the instructor in the course.	3.40	Most of the time
14. The instructor responds to my questions.	3.45	Most of the time
15. There was positive interaction between the instructor and me in the course.	3.41	Most of the time
Weighted Mean	3.42	Most of the time

Table 5 provides detailed information on the extent of learner-to-instructor interactions facilitated by course activities. The table shows weighted mean scores and verbal descriptions for each item. The highest weighted mean is 3.45 for both "Course activities require me to interact with the instructor in the course" and "The instructor responds to my questions," indicating that these interactions happen "most of the time." Other activities, such as initiating interaction with the instructor (3.41), replying to messages (3.40), and asking questions (3.40), also occur frequently. The overall average weighted mean is 3.42, suggesting that learner-to-instructor interactions generally occur "most of the time," which indicates that the response occurs frequently but not all the time.

This study has been elaborated in the works of Li et al. (2022), which claims that learner-to-instructor interactions significantly enhance learning satisfaction and achievement. The findings from Table 6 indicate that the instructional delivery at the college effectively promotes interactions between students and instructors, which is a crucial component of effective learning environments. This aligns with the study by Fauth et al. (2019), which highlights the importance of instructor responses and engagement in improving student outcomes. The implications for the seamanship lab are significant; fostering a collaborative environment where instructors are actively engaged with students can enhance the learning experience and ensure that students are well-supported. Regular interactions with instructors can lead to better understanding, higher satisfaction, and improved educational outcomes.

Table 6

The Extent of Delivery of Instructions among the College Faculty in terms of Learner to Content

Learner-to-Instructor	Weighted Mean	Verbal Description
9. Course activities require me to interact with the instructor in the course.	3.45	Most of the time
10. I respond to questions from the instructor.	3.38	Most of the time
11. I reply to messages from the instructor.	3.40	Most of the time
12. I initiate interaction with the instructor.	3.41	Most of the time
13. I ask questions of the instructor in the course.	3.40	Most of the time
14. The instructor responds to my questions.	3.45	Most of the time
15. There was positive interaction between the instructor and me in the course.	3.41	Most of the time
Weighted Mean	3.42	Most of the time

Table 6 provides detailed information on the extent of learner-to-content interactions facilitated by course activities. The table shows weighted mean scores and verbal descriptions for each item. The highest weighted mean is 3.45 for both "Course activities require me to interact with the instructor in the course" and "The instructor responds to my questions," indicating that these interactions happen "most of the time." Other activities, such as initiating interaction with the instructor (3.41), replying to messages (3.40), and asking questions (3.40), also occur frequently. The overall average weighted mean is 3.42, suggesting that learner-to-content interactions generally occur "most of the time", which indicates that the response occurs frequently but not all the time.

This study has been elaborated in the works of Li et al. (2022), which claims that learner-to-content interactions significantly enhance learning satisfaction and achievement. The findings from Table 7 indicate that the instructional delivery at the college effectively promotes interactions between students and the course content, which is a crucial component of effective learning environments. This aligns with the study by Quadir et al. (2019), which highlights the importance of active engagement with content in improving student outcomes. The implications for the seamanship lab are significant; fostering a collaborative environment where students are actively engaged with the content can enhance the learning

experience and ensure that students are well-supported. Regular interactions with course content can lead to better understanding, higher satisfaction, and improved educational outcomes.

Table 7

The Extent of Delivery of Instruction among the College Faculty in terms of Learner to Technology

Learner-to-Technology	Weighted mean	Verbal Description
22. I have used the technology required for my current class.	3.41	Most of the time
23. I had problems with the technology required for my current class.	3.21	Most of the time
24. I asked for assistance with the technology required for my current class.	3.29	Most of the time
25. Problems with the technology required for my current class prevented me from completing assignments.	3.25	Most of the time
26. Problems with the technology required for my current class prevented me from participating in my class.	3.29	Most of the time
Weighted Mean	3.29	Most of the time

Table 7 shows the extent of learner-to-technology interactions facilitated by course activities. The table shows weighted mean scores and verbal descriptions for each item. The highest weighted mean is 3.41 for "I have used the technology required for my current class," indicating that this interaction happens "most of the time." Other activities, such as asking for assistance with technology (3.29), and problems with technology preventing class participation (3.29) also occur frequently. The overall average weighted mean is 3.29, suggesting that learner-to-technology interactions generally occur "most of the time", which indicates that the response occurs frequently but not all the time.

This study has been elaborated in the works of Martin et al. (2019), which claims that effective use of educational technology significantly enhances learning experiences and outcomes. The findings from Table 8 indicate that while students frequently engage with required technology and seek assistance when needed, they also encounter technology-related problems that affect their participation and completion of assignments. This aligns with the study by Richardson et al. (2021), which highlights that while technology can greatly enhance learning, it also introduces challenges that need to be managed effectively. The implications

for the seamanship lab are significant; ensuring that students have reliable access to technology and support for troubleshooting can enhance their learning experience and prevent disruptions.

Table 8

The Extent of Delivery among the College Faculty in terms of Student Satisfaction

Student Satisfaction	Weighted Mean	Verbal Description
27. I am satisfied with the interaction with the instructor.	3.41	Most of the time
28. I am satisfied with the interaction with other students.	3.39	Most of the time
29. I am satisfied with the course activities.	3.41	Most of the time
30. I am satisfied with how I receive course materials and information.	3.38	Most of the time
31. I am satisfied with the technologies being used in the course.	3.39	Most of the time
32. I am satisfied with the technical support provided for the course.	3.41	Most of the time
33. I am satisfied with the technical support for the course (i.e., library resources).	3.37	Most of the time
34. The subject matter in this course was presented effectively.	3.40	Most of the time
35. Overall, I am satisfied with this course.	3.43	Most of the time
36. I would recommend a distance learning course to another student.	3.33	Most of the time
37. I would take another distance learning course in the future.	3.45	Most of the time
38. If I had a choice, I would choose a distance education course over a face-to-face course.	3.35	Most of the time
Weighted Mean	3.39	Most of the time

Table 8 shows the levels of student satisfaction with various aspects of their courses. Each item is rated with a weighted mean and a verbal description. The highest weighted mean is 3.45 for "I would take another distance learning course in the future," indicating that students feel this way "most of the time." Other high-rated items include satisfaction with instructor interaction (3.41), course activities (3.41), and technical support (3.41). The overall average weighted mean is 3.39, suggesting that students generally express satisfaction with these aspects "most of the time", which indicates that the response occurs

frequently but not all the time.

This study has been elaborated in the works of Chen and Denoyelles (2013), which claim that student satisfaction is significantly influenced by the quality of interactions, course content, and support services. The findings from Table 9 indicate that students are generally satisfied with their learning experience, particularly with the interactions with instructors and the effectiveness of the technical support provided. This aligns with the study by Lin and Gao (2021), which emphasizes that effective communication and robust technical support are critical in enhancing student satisfaction in online and blended learning environments. The implications for the seamanship lab are substantial; ensuring that students have positive interactions with instructors and reliable technical support can lead to higher satisfaction and better learning outcomes. Additionally, the high satisfaction with course activities and the willingness to take future distance learning courses highlight the importance of engaging and well-structured course content.

Problem 3. What is the level of academic performance of the respondents?

Table 9
The Level of Academic Performance of the Student Respondents

Grade	First Year		Second Year		Third year		Remarks
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
1.00-1.34	0	0.00%	0	0.00%	0	0.00%	Excellent
1.35-1.49	0	0.00%	0	0.00%	1	2.22%	Very Superior
1.50-1.74	14	15.73%	9	15.79%	25	55.55%	Superior
1.75-1.99	31	34.83%	33	57.89%	17	37.78%	Very Good
2.00-2.24	31	34.83%	14	24.56%	2	4.44%	Good
2.25-2.49	13	14.61%	1	01.75%	0	0.00%	Very Satisfactory
2.50-2.74	0	0.00%	0	0.00%	0	0.00%	Satisfactory
2.75-2.99	0	0.00%	0	0.00%	0	0.00%	Fair
3.00	0	0.00%	0	0.00%	0	0.00%	Passed
>3.00	0	0.00%	0	0.00%	0	0.00%	Failed
Total	89	100.00%	57	100.00%	45	100.00	
Mean	1.97		1.89		1.74		
Remarks	Very Good		Very Good		Superior		

Table 9 shows the academic performance of students across three academic years. The grades are categorized and their corresponding frequencies and percentages are presented. For the first year, the majority of students (34.83%) achieved a grade between 1.75-1.99, classified as "Very Good." Similarly, in the second year, 57.89% of students fell into the same grade category, maintaining the "Very Good" rating. In the third year, 55.55% of students achieved grades between 1.50-1.74, which is classified as "Superior." The mean grades over the three years show a progression from 1.97 ("Very Good") in the first year to 1.74 ("Superior") in the third year. The researcher sums all their grades based on each year's frequency to get their average weighted mean.

This study has been elaborated in the works of Wong et al. (2020), which claims that continuous academic improvement is indicative of effective teaching methods and student engagement. The findings from Table 10 show a general trend of improving academic performance among the students from their first to third year. This aligns with the study by Chen and Carbone (2018), which emphasizes the importance of consistent academic support and active learning strategies in fostering student success.

Problem 4. Does their academic performance differ significantly depending on the year level in marine transportation?

Table 10

The Difference in the General Academic Performance (GPA) Among the First Year to Third Year Level in Marine Transportation

Year Level	Mean GPA	p-value	Remarks
1	1.974		
2	1.894	<0.001	Significant
3	1.740		

Table 10 shows data on the mean GPA of students across three academic years, along with the statistical significance of the differences observed. The mean GPA for first-year students is 1.974, for second-year students is 1.894, and for third-year students is 1.740. The p-value is reported as less than 0.001, indicating that the differences in GPA across the three years are statistically significant. Each year's GPA varies due to older students, just like second-year and third-year students are more familiar with maritime equipment than first-year students. This suggests that students in Marine Transportation tend to have lower GPAs as they advance in their academic years.

This study has been elaborated in the works of Richardson et al. (2018), which claims that academic performance can significantly improve over time due to increased familiarity with the academic environment and enhanced study

skills. This aligns with the study by Johnson and Jones (2020), which emphasizes the importance of academic support systems and their positive impact on student performance over time. The implications for the seamanship lab are clear; providing continuous support and resources to students throughout their academic journey can significantly enhance their performance and lead to better educational outcomes.

Table 11

Pair-Wise Comparison of the Academic Performance (GPA) Among the First Year to Third Year Level in Marine Transportation

Year Level		GPA Mean Difference	p-value	Remarks
1	2	0.084	0.014	Significant
1	3	0.238	<0.001	Significant
2	3	0.154	<0.001	Significant

Table 11 presents the GPA mean differences between year levels along with their statistical significance. The mean difference between the first and second years is 0.084, with a p-value of 0.014, indicating a significant difference. The mean difference between the first and third year is 0.238, and between the second and third year is 0.154, both with p-values less than 0.001, indicating highly significant differences.

This study supports the data from Table 12, which highlights significant improvements in academic performance across the different year levels, indicating effective learning and adaptation by students. These findings underscore the importance of cumulative learning experiences and supportive educational environments, as supported by recent literature. The studies by Terenzini and Pascarella (2019) and Brown et al. (2021) reinforce the value of progressive academic support and challenging curricula in achieving higher academic performance and student success.

Problem 5. What are the variables that significantly affect academic performance?

Table 12

The Regression Analysis on Variables that Influence Academic Performance

Variable	β Coefficients	Standard Error	t −Statistic	P-value	Remark
Intercept	1.631	0.113	14.455	<0.001	Significant

Extent of the delivery of Instructor	0.045	0.035	1.267	0.207	Not Significant
Serviceability of Laboratory Facilities	0.003	0.001	2.914	0.004	Significant

Table 12 presents the results of a regression analysis to identify significant predictors of academic performance. The table includes β coefficients, standard errors, t-statistics, p-values, and remarks on the significance of each variable. The intercept has a β coefficient of 1.631 and a p-value of less than 0.001, indicating it is highly significant. The extent of the delivery of instruction by instructors has a β coefficient of 0.045 and a p-value of 0.207, suggesting it is not a significant predictor. The serviceability of laboratory facilities, with a β coefficient of 0.003 and a p-value of 0.004, is a significant predictor of academic performance.

This study has been elaborated in the works of Jones et al. (2019), which claims that various factors, including the quality of educational facilities and instructional delivery, can impact academic performance. The findings from Table 13 indicate that while the serviceability of laboratory facilities significantly affects academic performance, the extent of instructional delivery by instructors does not.

CONCLUSIONS

The study has generated new knowledge and contribution to the field of maritime education, which is effective facilitation of interactions among students and instructors. Course content is essential for creating a conducive learning environment and enhancing educational outcomes in maritime education. Laboratories for seamanship, bridge simulators, and chart rooms are functional, and improving the way teaching is delivered is essential to improving the learning outcomes of maritime students. Academic performance was not considerably impacted by the way in which teaching was delivered, but it was positively impacted by how well-maintained the laboratory facilities were. To maximize the benefits of practical training on student learning, instructor training expenditures are crucial. In the field of marine transportation, well-equipped laboratories have a favorable impact on students' academic achievement at all year levels by offering a hands-on setting that is essential for the development of practical skills. The Reciprocal Reinforcement Model of Effective Maritime Training emphasizes the value of integrating theoretical knowledge with real-world experience to improve student learning. It also emphasizes the synergistic impact of instructor expertise and well-equipped laboratories.

TRANSLATIONAL RESEARCH

Establish mentorship programs wherein seasoned marine professionals can serve as mentors to students, offering assistance, career recommendations, and real-world insights to help bridge the gap between academic learning and industry requirements.

Industry Collaborations for Internships: Establish collaborations with marine businesses to provide students with real-world internships that will help them apply their academic knowledge, obtain practical experience, and hone skills unique to the industry.

Continuous Professional Development for Teachers: Provide teachers with regular opportunities to improve their instruction, integrate experiential learning strategies, and stay current with industry developments so they can better prepare students for the rigors of the maritime sector.

Improving Laboratory Facilities: To create realistic simulation environments, encourage hands-on learning experiences, and improve safety, laboratories should invest in cutting-edge equipment, technology, and safety measures.

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