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Faculty and Students' Perceptions of Simulation-based Learning and its Impact on Student Achievement in the College of Marine Engineering at the Philippine Merchant Marine Academy (PMMA)

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Abstract

This study examines how faculty and students at the Philippine Merchant Marine Academy (PMMA) perceive simulation-based learning (SBL) and its impact on student achievement in the College of Marine Engineering. Using a descriptive-exploratory research design, the study gathered feedback from eight instructors and thirty-five first class (Fourth year) students. The results show that both faculty and students have a positive view of SBL. Faculty believe it enhances teaching by simplifying complex concepts and keeping students engaged, while students feel that simulations help them understand difficult topics, develop practical skills, and stay motivated. Both groups agree that SBL improves critical thinking and prepares students for real-life situations in the maritime industry. While there are some challenges, such as technical support and accessibility, the overall response is overwhelmingly positive. The Mann-Whitney U test showed no significant difference between faculty and student perceptions, indicating that both groups recognize the benefits of SBL. Based on these findings, the study proposes the SIM-AIM (Simulation-Assisted Instructional Mastery) program to address areas like technical support and resource accessibility, aiming to further improve learning outcomes and foster collaboration. This study underscores the value of simulation-based learning in enhancing education and preparing students for careers in marine engineering.

Keywords: Simulation-based learning, academic performance, teaching effectiveness

Introduction

Simulation-Based Learning (SBL) has become a game-changer in the College of Marine Engineering at the Philippine Merchant Marine Academy (PMMA). It effectively bridges the gap between classroom theories and hands-on practical skills. By using advanced simulators that replicate real-life marine engineering environments, students can safely develop expertise in areas like navigation, engine operations, and emergency management (Psotka, 2020) [24].

The success of SBL, however, heavily relies on the attitudes and perceptions of both faculty and students. Faculty members play a key role in bringing simulations to life. When instructors view SBL as an effective tool for engaging and immersive learning, they are more likely to innovate and integrate these tools into their lessons. At PMMA, many faculty members appreciate the benefits of SBL, noting that it enhances student engagement and sharpens critical thinking skills (Smith *et al*., 2018) [29].

Students, on the other hand, are equally important to the success of SBL. When they see simulations as realistic and relevant to their future careers, it motivates them to actively participate and master even the most challenging marine engineering concepts (Panadero *et al*., 2019) [22]. This is vital at PMMA, where students are being prepared for demanding roles in maritime industries. Beyond technical skills, these future marine engineers must be ready to face unexpected challenges at sea with confidence and efficiency.

Despite its clear advantages, SBL does come with challenges. Issues like limited resources and varying levels of technological skills among faculty and students can make implementation difficult (Johnson *et al*., 2020) [13]. Understanding how both faculty and students perceive these challenges and benefits is key to improving educational strategies at PMMA. By addressing these concerns, the

academy can ensure that SBL continues to enhance learning outcomes and prepares students effectively for their future in the maritime profession.

Integrated Related literature and Studies

Simulation-based learning has gained traction in maritime and engineering education due to its potential to enhance skill acquisition and preparedness. The Philippine Merchant Marine Academy, being a leading institution in maritime education, presents a unique context for exploring the perceptions of SBL among faculty and students.

Faculty at maritime institutions often perceive SBL as an indispensable tool for preparing students for real-world applications. According to Smith and Jones (2021) [28], instructors value simulations for their ability to provide realistic and risk-free learning environments. However, challenges such as the need for faculty development in using simulation tools are prevalent (Brown, 2020) [4].

Students generally view SBL positively, as it enhances engagement and understanding. In a study by Lopez (2022) [17], marine engineering students reported increased confidence in their practical skills after engaging with simulations. Nevertheless, some students expressed concerns over the initial complexity of the simulation tools (Garcia, 2020) [9].

SBL has been linked to improved academic performance and skill retention. A study conducted by Santos *et al.* (2023) [26] at the PMMA demonstrated that students involved in simulation-based modules scored higher on practical assessments compared to their peers engaged in traditional learning. Similarly, Murphy (2019) [19] found that SBL participants showed enhanced problem-solving skills and critical thinking.

Implementing SBL effectively requires overcoming certain barriers. High costs of simulation equipment and the need for continuous curriculum integration are significant challenges (Williams & Cruz, 2021) [31]. Furthermore, aligning simulations with course objectives to maximize educational benefits is crucial (Johnson, 2022) [12].

The review indicates that while SBL is perceived favorably by both faculty and students at PMMA for its immersive and engaging approach, its success hinges on strategic implementation and support. Further research might explore long-term impacts on career readiness and adaptability in the maritime industry.

Theoretical and Conceptual Framework

The theoretical framework of this study explores the underlying theories and models that inform the perceptions of faculty and students regarding simulation-based learning in the College of Marine Engineering at the Philippine Merchant Marine Academy (PMMA), as well as its impact on student achievements.

Constructivist learning theory posits that learners construct knowledge through experiences and reflections (Piaget, 1972; Vygotsky, 1978) [23, 32]. Simulation-based learning aligns with this theory as it provides students with hands-on, experiential learning opportunities that mimic real-world scenarios. This type of learning encourages active participation and critical thinking, which are crucial for marine engineering students who must apply theoretical knowledge to practical situations.

Kolb's Experiential Learning Model emphasizes learning as a process where knowledge is created through the transformation of experience (Kolb, 1984) [15]. It involves four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Simulation exercises in marine engineering education allow students to cycle through these stages, thereby enhancing understanding and retention of concepts.

The Technology Acceptance Model can help explain the perceptions and acceptance of simulation-based tools by both students and faculty. According to TAM, two primary factors-perceived usefulness and perceived ease of use-affect the acceptance and utilization of technology in educational environments (Davis, 1989) [6]. Understanding the faculty and students' reception of simulation technologies helps in assessing the integration and effectiveness of these tools in the curriculum.

Theoretical framework aims to provide a comprehensive understanding of how simulation-based learning is perceived and how it impacts student achievements. This framework guides the investigation into the factors that influence both faculty and student perceptions, ultimately informing curriculum development and instructional strategies within PMMA's College of Marine Engineering.

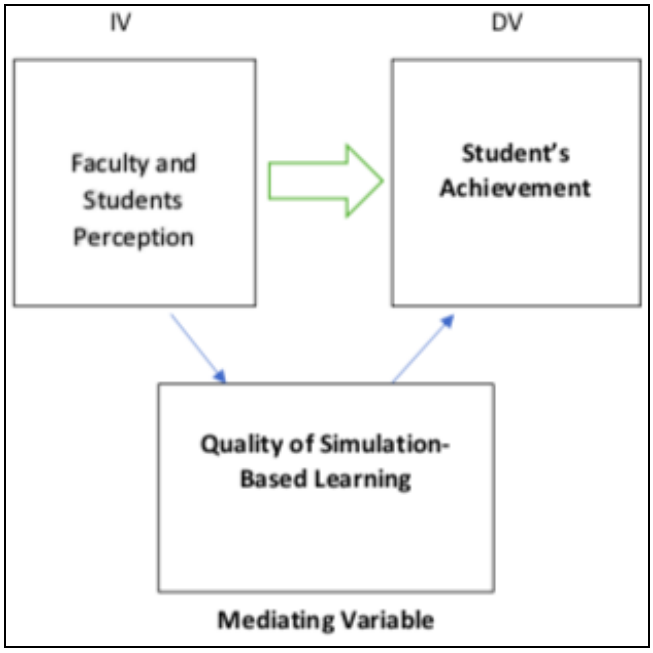

Fig 1: Paradigm of the Study

The independent variables which are the faculty and student perceptions linked by arrows to mediating variables which is the quality of simulation-based learning which then connect to the dependent variable which is the student achievements. This conceptual framework helps to illustrate the relationships between perceptions, the quality of simulation implementation, and how these affect student outcomes.

Statement of the Problem

The researcher tend to answer the following questions

1. What are the faculty's perceptions of simulation-based learning in terms of the following?
   1.1 Teaching effectiveness

1.2 Student engagement and participation
1.3 Learning outcomes
1.4 Usability and implementation
2. What are the students' perceptions of simulation-based learning in terms of the following?
2.1 Understanding of subject matter
2.2 Skill development
2.3 Engagement and motivation
2.4 Academic performance
2.5 Accessibility and usability
3. Is there a significant relationship between faculty and student perceptions of simulation-based training?
4. Based on the findings, what program enhancements can be developed to improve student achievement through simulation-based learning.

Definition of Terms

Academic Performance: How simulations impact the grades and overall academic success in the course of the students.

Engagement and Motivation: The students' perceptions of how engaging and motivating simulation-based learning is compared to other teaching methods.

Learning Outcomes: Examines the faculty perceptions regarding the extent to which simulation-based learning enables students to achieve the learning objectives, assessing its impact on knowledge retention and comprehension.

Skill Development: This involves students' views on how simulation-based learning contributes to the enhancement of their practical and critical-thinking skills.

Student Engagement and Participation: Measures how faculty perceive student involvement and active participation during simulation-based activities compared to traditional methods.

Teaching Effectiveness: Refers to faculty's assessment of how well simulation-based learning enhances their ability to teach and cover the curriculum efficiently.

Understanding of Subject Matter: How students perceive simulations impact their comprehension and grasp of the subject content.

Usability and Implementation: Faculty perceptions of the ease of integrating simulation tools into their teaching practice, including the technical, pedagogical, and administrative aspects involved.

Materials and Methods

Research Design

This study uses a descriptive-exploratory research design to better understand how faculty and students perceive simulation-based learning and how it impacts student achievement in the College of Marine Engineering at the Philippine Merchant Marine Academy (PMMA). The descriptive part of the study focuses on collecting both quantitative and qualitative data to paint a clear picture of how simulation-based learning is currently being adopted and how effective it is (Kyaw *et al*., 2019) [16]. By gathering feedback from both faculty and students, this study offer practical insights into how simulation-based learning can improve teaching and learning outcomes in maritime education.

Participants

The participants of the study were eight (8) instructors at the college of marine engineering that handle subjects with simulation and thirty-five (35) 1cl students (fourth year) from the College of Marine Engineering at the Philippine Merchant Marine Academy.

Ethical Considerations

The research was achieved in a fair, truthful and evident manner. The profile of the respondents gathered was treated with confidentiality and for research purpose only. Most of all, all the literature, studies and references were acknowledged and credited all the relevant literature, studies, and references used.

Instrumentation

There were two sets of survey questionnaires: one for the 1CL students and the other for instructors who teach subjects using simulations. The students' questionnaire started with basic information, such as their gender, age, year level, and grades in simulation-related subjects. The second part used a four-point Likert scale to understand their thoughts about simulation-based learning. It focused on areas like how well they understood the subject, how simulations helped them develop skills, their level of engagement and motivation, how it affected their academic performance, and whether the tools were easy to access and use. On the other hand, the instructors' questionnaire also began with their demographic details, including gender, age, years of teaching experience, highest educational qualification, specialization, and the subjects they teach that involve simulations. The second part, using a similar four-point Likert scale, looked into their views on simulation-based learning. It touched on important aspects like how effective simulations were for teaching, how engaged students were during classes, the overall learning outcomes, and how easy or challenging it was to use and implement these tools. This approach aimed to capture a clearer picture of how students and instructors experience and perceive simulation-based learning.

Procedure

The data collection process began with the determination of the study's inputs. After validating the questionnaires, the researcher, encoded on the google forms the survey questionnaire. For the data collection phase, the researcher send the survey to the target audience and collected the results.

Results and Discussion

Faculties' Perception on Simulation Based Learning

Below are the results and discussions on faculty perceptions on simulation-based learning in terms of teaching effectiveness, student engagement and participation, learning outcomes and usability and implementation.

Teaching Effectiveness

Table 1 shows the weighted mean and verbal interpretation on faculty perceptions on simulation-based learning in terms of teaching effectiveness

Table 1: Perceptions on Simulation-Based Learning in Teaching Effectiveness

Statements	Weighted Mean	SD	Verbal Interpretation
Simulations make it easier to explain complex concepts to students.	3.83	0.41	Strongly Agree
The use of simulations improves the clarity of lessons.	3.67	0.52	Strongly Agree
Simulations allow for more interactive and engaging teaching sessions.	4.00	0.00	Strongly Agree
The integration of simulations enhances my overall teaching performance.	3.50	0.55	Strongly Agree
GWA	3.75		Strongly Agree

We can observe from table 1 that when it comes to teaching effectiveness, the faculties strongly agree that simulations allow more interactive and engaging sessions (*WM=4.00, SD=0.00*), makes explaining complex concepts to students easier (*WM=3.83, SD=0.41*), improves the clarity of the lessons (*WM=3.67, SD=0.52*) and its integration enhances their over-all teaching performance (*WM=3.50, SD=0.55*). With the general weighted mean of 3.75, this implies that faculties strongly agreed that simulation-based learning improves their teaching effectiveness.

Research has demonstrated that simulations assist educators in clarifying complex and abstract concepts by offering visual and hands-on representations, particularly in technical disciplines such as STEM (Huang *et al*., 2021) [10]. Simulation-based instruction enhances student engagement and improves information retention, which in turn positively impacts the overall teaching effectiveness of instructors (Abdelkarim *et al*., 2014) [3].

Student Engagement and Participation

Table 2 shows the weighted mean and verbal interpretation on faculty perceptions on simulation-based learning in terms of student engagement and participation.

Table 2: Perceptions on Simulation-Based Learning in Student Engagement and Participation

Statements	Weighted Mean	SD	Verbal Interpretation
Simulations encourage active participation among students.	3.67	0.52	Strongly Agree
Students show greater interest in lessons when simulations are used.	3.67	0,52	Strongly Agree
Simulations help in sustaining students' attention during class.	3.83	0.41	Strongly Agree
Students are more motivated to learn with the use of simulations.	3.67	0.52	Strongly Agree
GWA	3.71		Strongly Agree

We can observe from table 2 that when it comes to students' engagement and participation, faculties strongly agree that simulations help students' attention sustained during class discussions (*WM=3.83, SD=0.41*), encourages their students to participate (*WM=3.67, SD=0.52*), as they showed greater interests (*WM=3.67, SD=0.52*) and are more motivated to learn (*WM=3.67, SD=0.52*). With the general weighted mean of 3.71, this implies that faculties strongly agreed that simulation-based learning increases students' engagement and participation in class.

Research shows that students exhibit greater interest and motivation when using simulations due to their practical, hands-on nature and relevance to real-world scenarios (Wang *et al*., 2020) [30].

Learning Outcomes: Table 3 shows the weighted mean and verbal interpretation on faculty perceptions on simulation-based learning in terms of learning outcomes.

Table 3: Perceptions on Simulation-Based Learning in Learning Outcomes

Statements	Weighted Mean	SD	Verbal Interpretation
Simulations help students develop critical thinking and problem-solving skills.	3.50	0.55	Strongly Agree
The use of simulations improves students' understanding of course content.	3.67	0.52	Strongly Agree
Simulations enhance students' ability to apply theoretical knowledge to practical situations.	3.83	0.41	Strongly Agree
Students achieve better academic performance in subjects taught using simulations.	4.00	0.00	Strongly Agree
GWA	3.75		Strongly Agree

We can observe from table 3 that when it comes to learning outcomes, faculties strongly agree that simulations help students achieved better academic performance (*WM=4.00, SD=0.00*), enhance their ability to apply theories to practical situations (*WM=3.83, SD=0.41*), improves students' understanding of course content (*WM=3.67, SD=0.52*) and help students to develop their critical thinking and problem solving skills (*WM=3.50, SD=0.55*). With the general weighted mean of 3.75, this implies that faculties strongly agreed that simulation-based learning improves learning outcomes. Studies indicate that simulation-based learning enhances students' learning outcomes by improving their understanding of complex topics, fostering critical thinking and bridging theoretical knowledge with practical application. For example, research highlights that such approaches lead to better academic performance and the development of essential skills like problem-solving (Huang *et al*., 2021) [10].

Usability and Implementation

Table 4 shows the weighted mean and verbal interpretation on faculty perceptions on simulation-based learning in terms of usability and implementation.

Table 4: Perceptions on Simulation-Based Learning in Usability and Implementation

Statements	Weighted Mean	SD	Verbal Interpretation
Simulations are easy to integrate into the teaching process.	3.67	0.52	Strongly Agree
The available simulation tools meet the specific needs of the subject.	3.50	0.55	Strongly Agree
Technical support for simulations is readily available when needed.	3.17	0.75	Strongly Agree
The time required to prepare simulation-based lessons is manageable.	3.50	0.55	Strongly Agree
GWA	3.46		Strongly Agree

We can observe from table 4 that when it comes to usability and implementation, faculties strongly agree that simulations are easy to integrate into their teaching process (*WM=3.67, SD=0.52*), met the specific needs of the subject (*WM=3.50, SD=0.55*), time requires to prepare lessons with simulations is manageable (*WM=3.50, SD=0.55*) since technical support is readily available when needed (*WM=3.17, SD=0.75*). With the general weighted mean of 3.47, faculties strongly agreed that simulation-based learning is easy to use and implement.

Studies highlight that simulations are effective in education due to their alignment with curricula, ease of integration, and manageable preparation requirements. User friendly interfaces and technical support further promote their adoption.

Research by Kyaw *et al*. (2019) [16] and Moro *et al*. (2017) [18] demonstrates that interactive and immersive simulation tools enhance teaching efficiency and educator satisfaction.

Students' perception on simulation- based learning

Below are the results and discussions on student perceptions on simulation- based learning in terms of understanding of the subject matter, skill development, engagement and motivation, academic performance and accessibility and usability

Understanding of subject matter

Table 5 shows the weighted mean and verbal interpretation on students' perceptions on simulation-based learning in terms of understanding of subject matter.

Table 5: Perceptions on Simulation-Based Learning in Understanding of Subject Matter

Statements	Weighted Mean	SD	Verbal Interpretation
Simulations make it easier to understand complex concepts.	3.60	0.50	Strongly Agree
The use of simulations enhances my comprehension of course topics.	3.54	0.51	Strongly Agree
Simulations help in visualizing abstract or theoretical ideas.	3.60	0.50	Strongly Agree
Learning through simulations bridges the gap between theory and practice.	3.57	0.55	Strongly Agree
GWA	3.56		Strongly Agree

We can observe from table 5 that when it comes to understanding of subject matter, students strongly agree that simulations makes them easier to understand complex concepts (*WM=3.60, SD=0.50*), helps in visualizing abstract or theoretical ideas (*WM=3.60, SD=0.50*) as it bridges the gap between theories and practice (*WM=3.57, SD=0.55*), it enhances their comprehensions to their course topics (*WM=3.54, SD=0.51*). With the general weighted mean of 3.56, students strongly agreed that simulation-based learning helps them to understand their subject matter.

Simulations help students visualize and grasp abstract or theoretical ideas, making these concepts more accessible and comprehensible. They bridge the gap between theory and practice, enabling students to apply what they've learned to real-world scenarios effectively (Sihaloho *et al*., 2017; Fu *et al*., 2022) [27, 8].

By integrating computer simulations, students not only gain deeper subject knowledge but also improve their systems thinking skills. This approach encourages students to analyze dynamic relationships and patterns within complex systems, fostering better academic outcomes (Fu *et al*., 2022) [8].

Skill development: Table 6 shows the weighted mean and verbal interpretation on students' perceptions on simulation-based learning in terms of skill development.

Table 6: Perceptions on Simulation-Based Learning in Skill Development

Statements	Weighted Mean	SD	Verbal Interpretation
Simulations improve my critical thinking and problem-solving skills.	3.57	0.56	Strongly Agree
The use of simulations enhances my decision-making abilities.	3.43	0.50	Strongly Agree
Simulations develop practical skills relevant to real-world applications.	3.49	0.66	Strongly Agree
I feel more confident in applying what I learned through simulations.	3.49	0.56	Strongly Agree
GWA	3.50		Strongly Agree

We can observe from table 6 that when it comes to learning development, students strongly agree that improve their critical thinking and problem-solving skills (*WM=3.57, SD=0.56*), develops their practical skills to become relevant in real-world applications (*WM=3.49, SD=0.66*) as they become more confident (*WM=3.49, SD=0.56*), it enhances their decision-making abilities (*WM=3.43, SD=0.50*). With the general weighted mean of 3.50, students strongly agreed that simulation-based learning helps them to develop their skills.

SBL promotes active learning, which helps students analyze and solve complex problems in a controlled environment. By engaging in simulations, students can experiment with different approaches to solve challenges, fostering their critical thinking skills (Hwang & Lai, 2017; Abas, 2020) [11, 1].

Simulations create a realistic setting where students can

practice technical skills relevant to their fields. This approach helps bridge the gap between theoretical knowledge and real-world application, making students better prepared for industry demands (Nix *et al*., 2020) [20].

Engagement and Motivation

Table 7 shows the weighted mean and verbal interpretation on students' perceptions on simulation-based learning in terms of engagement and motivation.

Table 7: Perceptions on Simulation-Based Learning in Engagement and Motivation

Statements	Weighted Mean	SD	Verbal Interpretation
Simulations make learning more engaging and enjoyable.	3.57	0.50	Strongly Agree
I am more motivated to participate in activities involving simulations.	3.49	0.51	Strongly Agree
Simulations maintain my interest in the subject throughout the lesson.	3.57	0.50	Strongly Agree
The interactive nature of simulations encourages me to stay focused on tasks.	3.49	0.51	Strongly Agree
GWA	3.53		Strongly Agree

We can observe from table 7 that when it comes to learning engagement and motivation, students strongly agree that they are more motivated to participate in activities (*WM=3.57, SD=0.50*), maintains their interest in the lesson (*WM=3.57, SD=0.50*), more motivated (*WM=3.49, SD=0.51*), because of its interactive nature that makes them stay more focused on tasks (*WM=3.49 SD=0.51*). With the general weighted mean of 3.53, students strongly agreed that simulation-based learning increases their level of engagement and motivation in the class.

SBL encourages active participation by creating interactive and engaging environments that motivate students to take part in classroom activities. The hands-on nature of simulations helps students connect with the material more deeply (Nixon *et al*., 2018; Zainuddin *et al*., 2020) [21, 33]. Simulations maintain student interest throughout lessons by offering visually appealing and dynamic content. They keep students focused on tasks by providing real-time feedback and an immersive learning experience (Freeman *et al*., 2017; Salas *et al*., 2019) [7, 25].

Academic Performance

Table 8 shows the weighted mean and verbal interpretation on students' perceptions on simulation-based learning in terms of academic performance.

Table 8: Perceptions on Simulation-Based Learning in Academic Performance

Statements	Weighted Mean	SD	Verbal Interpretation
Simulations have positively impacted my academic performance in this subject.	3.62	0.49	Strongly Agree
I perform better in assessments when simulations are part of the learning process.	3.54	0.51	Strongly Agree
Simulations help me retain knowledge longer compared to traditional methods.	3.48	0.56	Strongly Agree
I feel more prepared for exams after learning with simulations.	3.46	0.56	Strongly Agree
GWA	3.39		Strongly Agree

We can observe from table 8 that when it comes to academic performance, students strongly agree simulations positively impact their academic performance (*WM=3.62, SD=0.49*), they perform netter in assessments (*WM=3.54, SD=0.51*), as they can be able to retain knowledge longer (*WM=3.48, SD=0.56*), they felt more prepared during examinations (*WM=3.46 SD=0.56*). With the general weighted mean of 3.39, students strongly agreed that simulation-based learning improves their academic performances.

Accessibility and Usability

Table 9 shows the weighted mean and verbal interpretation on students' perceptions on simulation-based learning in terms of accessibility and usability.

Table 9: Perceptions on Simulation-Based Learning in Accessibility and Usability

Statements	Weighted Mean	SD	Verbal Interpretation
The simulation tools used are easy to navigate and understand.	3.46	0.66	Strongly Agree
The simulations are accessible and available when needed for learning.	3.43	0.56	Strongly Agree
I am provided with sufficient support and guidance when using simulations.	3.43	0.56	Strongly Agree
The simulations align well with the learning objectives of the course.	3.49	0.51	Strongly Agree
GWA	3.45		Strongly Agree

We can observe from table 9 that when it comes to accessibility and usability, students strongly agree simulations are aligned to the learning objectives of the course (*WM=3.49, SD=0.51*), they are easy to navigate and understand (*WM=3.46, SD=0.66*), it is accessible and available when needed (*WM=3.43, SD=0.56*) where sufficient support and guidance are provided (*WM=3.43 SD=0.56*). With the general weighted mean of 3.45, students strongly agreed that simulation-based learning are accessible and easy to use.

Ensuring that simulations are available when needed, coupled with adequate support and guidance, is fundamental for effective learning. Studies indicate that students are more likely to succeed in simulation-based learning when technical support and learning guidance are readily available (Kohn *et al*., 2018; Abd-El-Khalick *et al*., 2021) [14, 2].

Significant difference between faculties and students perceptions towards simulation based learning

Table 10 shows the result of differences towards the use of simulation in terms of teaching effectiveness versus understanding subject matter, student engagement versus engagement and motivation, learning outcomes versus skills development, learning outcomes versus academic performance and usability and implementation versus accessibility and usability of simulation based learning as perceived by faculties and students respectively using the Mann-Whiney U test.

Table 10: Significant Between Faculties and Students Perceptions Towards Simulation-Based Learning

Faculties vs. Students Perceptions	Mann-Whitney U	p-value	Decision
Teaching Effectiveness vs. Understanding Subject Matter	87.00	0.470	Accept Ho
Student Engagement vs. Engagement and Motivation	98.00	0.781	Accept Ho
Learning Outcomes vs. Skills Development	104.00	0.969	Accept Ho
Learning Outcomes vs. Academic Performance	104.00	0.969	Accept Ho
Usability and Implementation vs. Accessibility and Usability	95.00	0.697	Accept Ho

We can observe from table 10 that faculties' perceptions on teaching effectiveness and students' understanding on subject matter (*U=87.00, p= 0.470*) shows that there is no significant difference. This implies that faculties and students believed that simulations are effective tool in teaching as it helps to develop students understanding on a given subject matter. In terms of faculties perceptions towards student engagement and students' perceptions on engagement and motivation with the use of simulation (*U=98.00, p= 0.781*) shows no significant difference which implies that both the faculties and students believed that simulations promotes students engagement and increases motivation among students. When it comes to the perceptions of faculties on learning outcomes and students' perceptions on skills development (*U=104.00, p= 0.969*) and academic performance development (*U=104.00, p= 0.0.969*) shows no significant differences which implies that both faculties and students perceived that with the use of simulations learning outcomes such as skills development and academic performance will improve. Lastly, when it comes to the perceptions of faculties towards usability and implementation as compared to students' perceptions on accessibility and usability (*U=95.00, p= 0.697*) shows no significant difference and this implies that both the faculties and students' perceived that simulations are accessible and easy to use.

Simulation-based learning is widely recognized for its ability to enhance both teaching and student comprehension. Faculty and students often agree that simulations clarify complex concepts and provide practical learning experiences, leading to improved subject mastery. Studies show that simulations are equally valued by educators and students for their effectiveness in teaching technical and abstract concepts (Huang *et al.* 2021, Cook *et al.* 2022) [10, 5].

Proposed Program Based on the Results of the Study

Proposed Program: SIM-AIM (Simulation-Assisted Instructional Mastery)

Program Rationale

Based on the study results, both faculty and students at PMMA strongly agree on the benefits of simulation-based learning (SBL) in improving teaching effectiveness, student engagement, learning outcomes, and usability. However, there are areas like technical support and accessibility that require enhancement. The SIM-AIM program aims to address these gaps and maximize the effectiveness of SBL in maritime education.

Program Objectives

1. **Enhance Faculty Competence:** Equip faculty with advanced simulation-based teaching techniques and technical skills.
2. **Optimize Student Learning:** Provide students with additional resources and support to fully leverage SBL.
3. **Strengthen Infrastructure and Support Systems:** Ensure robust technical support, accessible simulation tools, and alignment with learning objectives.
4. **Foster Collaboration:** Promote a collaborative environment for faculty and students to share feedback and best practices in SBL.

Program Components

A. Faculty Development Workshops

1. **Objective:** Enhance teaching effectiveness using simulations.

Activities

- Training on advanced simulation design and integration.
- Workshops on aligning simulations with course objectives.
- Peer observation and feedback sessions.
- Student Learning Enrichment Sessions

2. **Objective:** Improve student engagement, skill development, and academic performance.

Activities

- Simulation practice sessions outside class hours.
- Tutorials on navigating and using simulation tools effectively.
- Peer-led discussion groups for collaborative learning.
- Technical Support and Resource Enhancement.

3. **Objective:** Ensure the accessibility and usability of simulation tools.

Activities

- Hiring or training dedicated technical support staff.
- Creating a centralized online repository for simulation resources.
- Regular maintenance and updates for simulation software and hardware.
- Feedback and Evaluation Mechanism.

4. **Objective:** Continuously improve the SBL experience.

Activities

- Regular surveys and focus group discussions to gather

feedback from faculty and students.
- Implementation of suggested improvements based on feedback.
- Monitoring the impact of SBL on academic performance through data analysis.
- Recognition and Incentives.

5. **Objective:** Motivate faculty and students to actively participate in SBL.

Activities
- Recognition for innovative teaching practices using simulations.
- Awards for students demonstrating excellence in simulation-based assessments.

B. Program Implementation Plan

Activity	Timeline	Responsible Unit	Resources Required
Faculty Development Workshops	Quarterly	Training Department	Trainers, simulation software licenses
Student Enrichment Sessions	Monthly	Academic Affairs Office	Lab access, tutorial guides
Technical Support Deployment	Ongoing	IT Department	Additional staff, troubleshooting guides
Feedback Collection and Analysis	Every Semester	Quality Assurance Team	Survey tools, data analysis software
Recognition Program Launch	Annually	HR/Student Affairs	Certificates, incentives

C. Expected Outcomes
- Increased faculty confidence and competence in using simulations.
- Improved student engagement, critical thinking, and academic performance.
- Enhanced technical support and seamless integration of simulations in courses.
- A sustainable culture of collaboration and innovation in SBL.

D. Monitoring and Evaluation

1. KPIs
- Percentage increase in student academic performance.
- Faculty and student satisfaction ratings on SBL.
- Number of faculty and students utilizing simulation tools.

2. Methods
- Pre- and post-implementation surveys.
- Analysis of academic performance data.
- Regular review meetings with stakeholders.

The SIM-AIM program ensures a holistic approach to strengthening simulation-based learning at PMMA, fostering academic excellence and maritime readiness.

Conclusion

The researcher draws the following conclusion based on the findings.

1. This study shows that both teachers and students have a positive view of simulation-based learning. Teachers find simulations helpful in explaining difficult concepts, keeping students engaged, and improving their teaching methods. On the other hand, students see simulations as tools that make learning more engaging, easier to understand, and useful for building practical skills.
2. Both groups agree that simulations help connect theory to real-world applications, leading to better academic performance and sharper critical thinking skills. They also find the tools easy to use and well-aligned with their learning goals.
3. The results of the Mann-Whitney U test confirmed that there's no significant difference between the opinions of teachers and students. This shared perspective highlights how effective simulations can be in improving both teaching and learning experiences.
4. Simulations are proving to be a powerful tool in modern education, helping to boost engagement, develop skills, and improve overall learning outcomes.

Recommendation

Based on the results of this study, here are some suggestions to make learning more effective and engaging:

1. Teachers and schools should use simulation-based tools more often, especially for subjects in engineering. Simulations help students understand tough concepts and keep them more engaged in learning.
2. Schools should organize training sessions so teachers feel confident using simulation tools. With proper training, teachers can get the best results from these technologies and make learning more fun and interactive.
3. Schools should invest in reliable simulation software and the right equipment. This way, both teachers and students can use these tools regularly without technical issues or limitations.
4. Future studies can look at the long-term impact of simulations on students' performance. It's also worth exploring how simulations work for younger students, different subjects, or when compared to other teaching strategies.
5. Teachers should ask students for feedback about simulation tools. Understanding what students like or struggle with can help improve the learning experience and keep it more student-centered.

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