Maritime Technology and Research

https://so04.tci-thaijo.org/index.php/MTR

Research Article

21st century learning skills of maritime faculty in the Province of Antique, Philippines

Peter Ralph B. Galicia*, Nonie C. Maravillas, Rowen M. Samillano, Cenen Archie V. Huera and Fred Lyndon M. Pechuanco

Faculty of Maritime, University of Antique, Main Campus Lotilla St., Sibalom, Antique 5713, Philippines

Article information

Received: February 7, 2024
1st Revision: May 14, 2024
2nd Revision: June 1, 2024
Accepted: June 10, 2024

Keywords
The 21st century learning skills;
Maritime education;
Maritime faculty

Abstract

The demands of the 21st century require educators to adapt and empower themselves with essential traits and skills to cope with the changes and bridge the gap, as they play a significant role in shaping the lives and careers of their students. This descriptive-correlational study aimed to determine the 21st century learning skills of maritime faculty in the Province of Antique, Philippines. The data gathering instrument used was a researcher-constructed questionnaire on 21st century skills, adapted from the study of Kelly et al. (2019), which was revised, contextualized to the local setting, and duly validated by a jury composed of five members. The statistical tools were mean, frequency, and percentage for descriptive analysis; the Mann-Whitney U test; and the Kruskal-Wallis H test for inferential analysis. The alpha level was set at 0.05. The study found that, generally, maritime faculty had a high level of 21st century learning skills. A significant difference existed in the maritime faculty's level of skills in 21st century learning in terms of communication and media fluency when classified as to the length of service as a seafarer. No significant difference existed in the maritime faculty's level of skills in 21st century learning in terms of collaboration, teamwork, and leadership skills; critical thinking and problem-solving skills; or creativity and innovation skills when grouped according to age, civil status, length of service as faculty, length of service as a seafarer, and educational attainment. Further, in terms of the communication and media skills of maritime faculty, no significant difference was found to exist when they were grouped according to age, civil status, length of service as faculty, and length of service as a seafarer.

1. Introduction

Change is a constant occurrence in the world that leads to diverse and various effects in our lives as humans. The world changes, technology changes, and so do people and their ways of living. These tremendous positive and negative changes create a gap among humans in almost all walks of life, including age, generation, culture, communication, and digital literacy (Chico, 2018). Chico (2018) emphasized that the demands of the 21st century require educators to adapt and empower themselves with essential traits and skills to cope with the changes and bridge the gap, as they play a significant role in shaping the lives and careers of their students. Ruettgers (2016) added that students, communities, and nations thrive when teaching and learning are at their best.

*Corresponding author: *Faculty of Maritime, University of Antique, Main Campus Lotilla St., Sibalom, Antique 5713, Philippines*
E-mail address: antique_1985@yahoo.com.ph

In the 21st century classroom, educators are facilitators of student learning and creators of productive learning environments in which students can develop the skills and competence they need in the present and in future employment opportunities (Galicia, 2021, 2022). Educators, alongside students, will also be equipped with creative, innovative learning, using advanced technology (Dahalan et al., 2020) and other necessary skills to meet the challenges of more engaging and effective modern teaching (Department of Science and Technology, 2018).

Several studies (Chico, 2018; Creighton, 2018; Jarrahi et al., 2019) have revealed that most educators nowadays are considered digital immigrants who tend to use the conventional way of teaching, while learners are digital natives who prefer to use technology and an interactive way of teaching the lesson for them to be engaged in classroom activities, learn the lesson, and apply what they have learned in a real-life situation. Further, Sharma and Kim (2021) investigated the applicability of the current STCW requirements for officers in command of a navigational watch in Table A-II/1, which applies to navigation officers in an operational position. Five major unique technical competence topics have emerged: IT capabilities, safety and security management skills, understanding of engine room operations, electronic equipment, and system integration. Non-routine problem solving, self-regulation capacity, critical thinking, mental readiness, systematic thinking, the ability to develop trust in teams, the ability to adjust to cultural differences, and negotiation abilities were examples of novel non-technical skills that could be useful for future autonomous operations. Furthermore, Odabaşı et al. (2023) revealed that 21st century skills, especially information and communication technology skills, are important for both teachers and students to keep up with in the rapidly developing age of technology. In the process of integrating Information and Communication Technology (ICT) skills into the education system, suggestions can be developed for how teachers can plan their lessons. Sarinas (2019) found that maritime cadets often practiced personal and social responsibility, communication, critical thinking, making decisions in everyday life, solving problems, and assessing teamwork. Thus, this needs to be harnessed and improved, because these skills are very useful not only in their day-to-day lives after graduation but also onboard ship. Thus, educators' roles are being challenged in the changing landscape of 21st century learning.

Educators' quality of instruction is also one of the major concerns in Maritime Higher Education Institutions (MHEIs) regarding 21st century learning (Ziarate et al., 2020). Seafarers are skilled professionals who serve as marine officers onboard ships. Their venture into teaching in maritime schools as full-time instructors entails a big transition and a sharp turn of events in their role and way of life (Estimo, 2020; Philippine Overseas Employment Agency, 2016; Joint CHED-MARINA Memorandum Circular No. 1, 2019). Thus, the quality of teaching and learning is threatened by today's constantly changing world, and it is the major concern of the maritime institutions in the Philippines in how to enhance the quality of maritime education in order to maintain international standards. To address this, the quality of maritime faculty must be given utmost priority, especially their skills in 21st century learning; hence, this study.

1.1 Theoretical framework of the study

This study is anchored by the Skill Acquisition Theory. According to Mystkowska-Wiertelak and Pawlak (2012), as cited by Taie (2014), skill acquisition theory is not just a language development theory, but a general theory of learning, ranging from cognitive to psychomotor skills. Based on Anderson's Adaptive Control of Thought model (ACT), this theory claims that adults learn something through mainly explicit processes and, through subsequent sufficient practice and exposure, proceed to implicit processes (Vanpatten & Benati, 2010). Thus, teachers need a series of practice and exposure to enhance their skills on 21st century learning to help today's students succeed in their careers during this Information Age.

1.2 Conceptual framework of the study

A thorough examination of the previously cited figure reveals that the independent variables of the study are the personal profiles of the respondents, such as age, civil status, length of service as faculty, length of service as a seafarer, and educational attainment. The respondents' ages range from young (below 40 years old) to old (41 years old and above); their civil status can be classified as single or married; their length of service as faculty can be classified as short (below 10 years) or long (11 years and above); their length of service as a seafarer can be classified as short (below 10 years) or long (11 years and above); and their educational attainment can be classified as Bachelor's degree, Master's degree, or Doctoral degree.

The dependent variables in this study were 21st century learning skills, specifically, the 4Cs: collaboration, teamwork, and leadership skills; critical thinking and problem-solving skills; creativity and innovation skills; and communication and media fluency skills. The study categorized the 21st century learning skills of the maritime faculty into four levels: very high, high, moderate, low, and extremely low.

Figure 1 illustrates in graphic form the paradigm of this study.

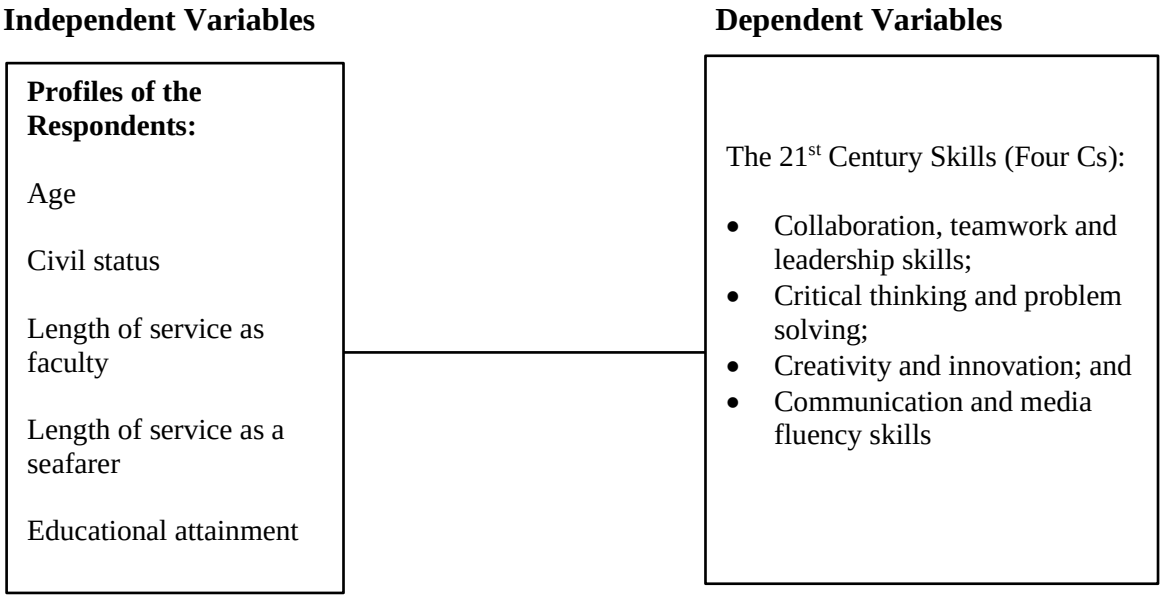

Figure 1 Paradigm of the study.

1.3 The objectives of the study

This study aimed at determining the 21st century learning skills of maritime faculty in the Province of Antique for the school year 2022 - 2023, in terms of collaboration, teamwork, and leadership skills; critical thinking and problem-solving skills; creativity and innovation skills; and communication and media fluency skills, when they are taken as a whole, and when they are classified according to age, civil status, length of service as faculty, length of service as a seafarer, and educational attainment. It further aimed at determining whether or not these variables would significantly differ with each other.

1.4 Hypothesis

Based on the preceding problems, the following hypothesis was tested: there are no significant differences in the 21st century skills of maritime faculty in terms of collaboration, teamwork, and

leadership skills; critical thinking and problem-solving skills; creativity and innovation skills; and communication and media fluency skills, when they are classified according to age, civil status, length of service as faculty, length of service as a seafarer, and educational attainment.

1.5 Limitation of the study

The study included 42 maritime faculty members from the only two (2) maritime schools located in the Province of Antique, Philippines. We selected the respondents through total population sampling, as all of them were available during the research data gathering. The total population sampling technique, a type of purposive sampling, involves examining the entire population that possesses a particular set of characteristics, such as specific attributes or traits, experience, knowledge, skills, exposure to an event, etc. The researchers deliberately included in their sample those individuals who aligned with the study's purpose or objective. The study involved 100 % of the total population of maritime faculty members from two (2) recognized MHEIs for the school year 2022 - 2023, who participated as respondents.

Data was gathered using a questionnaire-checklist on 21st century learning skills, which was adapted from the study of Kelly et al. (2019). Items of the said instrument were revised, contextualized to the local setting, and underwent face and content validation by a jury composed of five members. The questionnaire also underwent pilot testing to assess its reliability. The results of the study are based on the respondents' self-assessment of their 21st century learning skills.

2. Methodology

2.1 Research design

This descriptive correlational study aimed to identify the level of maritime faculty's 21st century learning skills. The descriptive method of research was employed in this investigation, since the data were collected to answer questions concerning the level of maritime faculty's 21st century learning skills.

According to Fraenkel et al. (2012), descriptive research focuses on present conditions, and interprets the conditions that are happening at the moment. A descriptive study is a process involving collections of data to test a hypothesis, answer questions concerning the status of the subject of the investigation, and document the way things and condition are (Mills & Gay, 2019). In other words, it is something more than, and beyond, just data gathering. The true meaning of the data collected was reported from the point of view of the objectives of the basic assumption of the study.

The study also used quantitative methods of inquiry. This is the most appropriate method when the study seeks to identify the factors that might affect a specific outcome. Furthermore, this method emphasizes objective measurements and the statistical, mathematical, or numerical analysis of data collected through questionnaires and surveys (Mills & Gay, 2019).

On the other hand, correlational research attempts to determine whether, and to what degree, a relationship exists between two or more quantifiable variables. The purpose of correlation research may be to establish a relationship (or lack of one), or use relationships to make predictions. Relationship investigations typically study several variables believed to be related to a major and complex variable (Mills & Gay, 2019).

The data needed for this research were gathered through the use of a researcher-made questionnaire checklist adapted from the study of Kelly et al. (2019). Items of the said instrument were revised, contextualized to the local setting, and underwent face and content validation by a jury composed of five members. The questionnaire also underwent pilot testing to assess its reliability.

Means, frequency, and percentage for descriptive analysis; the Mann-Whitney U test for independent samples, Kruskal-Wallis H Test, and the Spearman rho rank correlation were used as statistical tools. The alpha level was set at 0.05.

2.2 Respondents of the study

The respondents in this study were 42 purposively selected maritime faculty from only two (2) maritime schools in the Province of Antique: Maritime Higher Education Institutions (MHEIs) which were fully recognized by the Maritime Industry Authority (MARINA) and Commission on Higher Education (CHEd) to offer Bachelor of Science in Marine Transportation (BSMT) and/or Bachelor of Science in Marine Engineering (BSMarE) as of 2019 (Commission on Higher Education, 2018).

The respondents were categorized as two separate groups in terms of their school of origin, namely, University of Antique-Main Campus (UA-Main), and Saint Anthony's College (SAC). There were 32 respondents from UA, and ten respondents from SAC.

The respondents were selected through total population sampling for their relevance as seafarers turned instructors, and the sample size was calculated to ensure the effectiveness of the study. Total population sampling technique is a type of purposive sampling technique that involves examining the entire population that have a particular set of characteristics, such as specific attributes/traits, experience, knowledge, skills, exposure to an event, etc. Those who meet the purpose or objective of the study are being deliberately included by the researchers in their sample. One hundred percent (100 %) of the total population of maritime faculty members from two (2) recognized MHEIs for school year 2022 - 2023 were involved as respondents of the study. **Table 1** shows the distribution of the respondents.

Table 1 Distribution of the respondents.

Type of Maritime School	N	%
A. Public	32	0.76
B. Private	10	0.24
Total	42	100

2.3 Data gathering instrument

The data needed for the present research were drawn from a questionnaire checklist on the 21st century learning skills of maritime faculty adapted from the study of Kelly et al. (2019). Items of the said instrument were revised, contextualized to the local setting, and underwent face and content validation by a jury composed of five members. The questionnaire also underwent pilot testing to assess its reliability.

The instrument was constructed based on the 21st century learning skills of maritime faculty. This instrument consisted of two parts: Part I elicited personal information on the maritime faculty's age, civil status, length of service as faculty, length of service as a seafarer, and educational attainment. Part II elicited data on the 21st century learning skills of maritime faculty. This instrument comprised a total of 50 questions, with 22 questions focusing on collaboration, teamwork, and leadership skills; 11 questions on critical thinking and problem-solving skills; 8 questions on creativity and innovation skills; and 9 questions on communication and media fluency skills. To answer this portion of the instrument, the respondents were instructed to choose from among the following options: "Always," "Often," "Sometimes," "Rarely", and "Never".

The score of an individual respondent in the instrument was determined by adding the numerical equivalent of the option chosen, and then the mean was computed. The mean was transmuted into a numerical scale, with assigned interpretations and description (**Table 2**).

Table 2 Presents the numerical scale with an assigned description and interpretation.

Scale of Means	Description	Interpretation
4.21 - 5.00	Very High	Faculty members are highly skillful in 21st century learning
3.41 - 4.20	High	Faculty members are skillful in 21st century learning
2.61 - 3.40	Moderate	Faculty members are moderately skillful in 21st century learning
1.81 - 2.60	Low	Faculty members are slightly skillful in 21st century learning
1.00 - 1.80	Very Low	Faculty are not skillful in 21st century learning

2.4 Validity of the research instrument

The research instrument used in this study underwent face and content validation by a jury of five members. This jury was requested by the researchers to validate the items in questionnaire by writing before each item options: Include, Improve, or Exclude. The researchers then examined the responses made by the jury members, and the agreement ratio was computed for each item.

To determine the validity of this instrument, items with an agreement ratio of 80 % and above were accepted and included in the final draft of the instrument, while items with an agreement ratio of below 80 % were excluded. Items that the jury members rated as Improve were revised, based on the suggestions given, before their inclusion in the final draft.

2.5 Reliability of the research instrument

To determine the reliability of this instrument, pilot testing was done by 30 purposively selected faculty members handling general education courses at the University of Antique. In addition, a Cronbach alpha was computed to determine whether the research instruments were valid.

A four-part questionnaire was sent to 30 faculty members. The collaboration, teamwork, and leadership skills subscale consisted of 22 items ($\alpha = 0.982$), the critical thinking and problem-solving skills subscale consisted of 11 items ($\alpha = 0.976$), the creativity and innovation skills subscale consisted of eight (8) items ($\alpha = 0.962$), and the communication and media fluency skills subscale consisted of nine (9) items ($\alpha = 0.972$). The overall questionnaire consisted of 50 items, and the value of Cronbach's Alpha was $\alpha = 0.993$.

According to Alicias (1995), there is no hard-and-fast rule regarding which factor load to be retained or culled, except that which the investigator arbitrarily defines. However, a factor loading equal to, or greater than, +0.5 appears to be commonly used. After the pilot testing, the researchers prepared a final copy of the research instrument, which was reproduced and distributed to the target respondents.

2.6 Data gathering procedure

The study was conducted with approval obtained from the offices of the university and college presidents and deans of recognized maritime higher education institutions (MHEIs) in the Province of Antique.

The researchers personally administered the research instrument to the respondents in their respective schools. Likewise, the researchers informed the respondents personally about the nature of the study, and assured them that all their responses would be treated with the utmost confidentiality. Finally, they were given the opportunity to withdraw as respondents to the study at any time if they

did not feel comfortable with it. After retrieving the questionnaire, the researchers tallied, processed, analyzed, and interpreted the data.

3. Results of the study

3.1 Level of the 21st century learning skills of maritime faculty

The 21st century learning skills of maritime faculty, when taken as a whole and classified according to certain variables, were determined by computing the mean scores.

3.1.1 Collaboration, teamwork, and leadership skills

When taken as a whole, the maritime faculty in this investigation were skillful in 21st century learning in terms of collaboration, teamwork and leadership skills, with an obtained overall mean score of 3.49. A scrutiny of the means in the same table reveals that faculty obtained a highest mean score in the indicators for being polite and kind to teammates (M = 3.63), involving all team members in tasks (M = 3.56), and following the rules for team decision-making (M = 3.55), described as high.

However, the items of the questionnaire which got a lowest mean were helping resolve issues without asking the teacher for help (M = 3.25), described as moderate. This means that the maritime faculty skillfully establishes politeness, kindness, active involvement in tasks, and being rule-abiding team members in the classroom. However, the maritime faculty allows the team members to resolve issues without proper intervention.

Table 3 presents the level of maritime faculty's 21st century learning skills in terms of collaboration, teamwork, and leadership skills, when taken as a whole.

Table 3 Level of maritime faculty's 21st century learning skills in terms of collaboration, teamwork, and leadership skills, when taken as a whole.

Category	Mean	Description
I am polite and kind to teammates.	3.63	High
I involve all team members in tasks.	3.56	High
I follow the rules for team decision-making.	3.55	High
I make sure all team members' ideas are equally valued.	3.54	High
I come physically and mentally prepared each day.	3.54	High
I interact with team members effectively.	3.53	High
I offer assistance to others in their work when needed.	3.52	High
I acknowledge and respect other perspectives.	3.52	High
I improve my work when given feedback.	3.50	High
I follow the rules for team meetings.	3.50	High
I track our team's progress toward goals and deadlines.	3.49	High
I consistently use technology as agreed upon by the team to manage project tasks.	3.49	High
I complete research to contribute to the team.	3.48	High
I use time, and run meetings, efficiently.	3.47	High
I make detailed plans about the use of technology.	3.47	High
I make detailed plans about how the team will work together.	3.46	High
I help the team solve problems and manage conflicts.	3.45	High
I create a task list that divides project work reasonably among the team.	3.43	High
I provide feedback useful to team member.	3.43	High
I assign roles as needed, based on team members' strengths.	3.43	High
I complete tasks without having to be reminded.	3.43	High
I help resolve issues without asking the teacher for help.	3.25	Moderate
Overall Mean	**3.49**	**High**

Scale of Means: 4.21 - 5.00 Very High; 3.41 - 4.20 High; 2.61 - 3.40 Moderate; 1.81 - 2.60 Low; 1.00 - 1.80 Very Low

The maritime faculty's 21st century learning skills are "high" when classified according to age, civil status, length of experience as faculty, length of experience as a seafarer, and educational

attainment. However, maritime faculty who are more than 40 years old have moderate skills in 21st century learning, as compared to their counterparts, with an obtained mean score of 3.40. The above findings indicate that, regardless of the profile of the faculty, they are skillful in 21st century learning in terms of collaboration, teamwork, and leadership skills.

Table 4 presents the maritime faculty's 21st century learning skills in terms of collaboration, teamwork, and leadership skills, when classified as to variables.

Table 4 Level of maritime faculty's 21st century learning skills in terms of collaboration, teamwork, and leadership skills, when classified as to variables.

Variables	N	Mean	SD	Description
As a Whole	42	3.44	0.49	High
Age				
40 years old and below	9	3.40	0.42	Moderate
More than 40 years old	33	3.45	0.44	High
Civil status				
Single	6	3.65	0.39	High
Married	36	3.46	0.44	High
Length of service as faculty				
10 years and below	29	3.48	0.41	High
More than 10 years	13	3.50	0.50	High
Length of service as seafarer				
10 years and below	14	3.58	0.40	High
More than 10 years	28	3.43	0.46	High
Educational attainment				
Bachelor's Degree	27	3.44	0.42	High
Master's Degree	11	3.51	0.47	High
Doctorate Degree	4	3.70	0.47	High

Scale of Means: 4.21 - 5.00 Very High; 3.41 - 4.20 High; 2.61 - 3.40 Moderate; 1.81 - 2.60 Low; 1.00 - 1.80 Very Low

3.1.2 Critical thinking and problem-solving skills

When taken as a whole, the maritime faculty in this investigation exhibited a "high" level of skills in 21st century learning, in terms of critical thinking and problem-solving skills, with an obtained overall mean score of 3.45. A scrutiny of the means in the same table reveals that maritime faculty obtained the highest mean score in the indicators for understanding how knowledge or insights might transfer to other situations or contexts (M = 3.54), and they gather relevant and sufficient information from different sources (M = 3.51), described as high.

However, the items of the questionnaire which obtained the three lowest means, understanding a Driving Question (M = 3.40), identifying in detail what needs to be known to answer a science inquiry question (M = 3.40), and revising drafts and justifying revisions with evidence (M = 3.32) were described as moderate. This means that the maritime faculty skillfully transfer knowledge to other contexts and gather information from various sources relevant to teaching 21st century skills.

Table 5 presents the level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills, when taken as a whole.

The maritime faculty's 21st century learning skills are high when classified according to age, civil status, length of service as faculty, length of service as a seafarer, and educational attainment. However, maritime faculty with more than 10 years of seafaring experience and Bachelor's degree holders have a moderate level of skills in 21st century learning, compared to their counterparts, with mean scores of 3.40 and 3.40, respectively.

Table 5 Level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills, when taken as a whole.

Category	Mean	Description
I understand how knowledge or insights might transfer to other situations or context.	3.54	High
I gather relevant and sufficient information from different sources.	3.51	High
I evaluate reasoning and evidence that support an argument.	3.50	High
I thoroughly assess the quality of information.	3.48	High
I recognize the limitations of our design and know when to consider alternatives.	3.47	High
I develop follow-up questions that focus or broaden the inquiry.	3.45	High
I develop follow-up questions to gain an understanding of the wants and needs of the client or product users.	3.45	High
I justify choices of evaluation criteria.	3.43	High
I identify in detail what needs to be known to answer a science inquiry question.	3.40	Moderate
I understand a Driving Question (questions that lead to critical thinking).	3.40	Moderate
I revise drafts and justify revisions with evidence.	3.32	Moderate
Overall Mean	3.45	High

Scale of Means: 4.21 - 5.00 Very High; 3.41 - 4.20 High; 2.61 - 3.40 Moderate; 1.81 - 2.60 Low; 1.00 - 1.80 Very Low

Table 6 presents the level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills, when classified as to variables.

Table 6 Level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills, when classified as to variables.

Variables	N	Mean	SD	Description
As a whole	42	3.43	0.52	High
Age				
40 years old and below	9	3.56	0.46	High
More than 40 years old	33	3.42	0.46	High
Civil status				
Single	6	3.64	0.43	High
Married	36	3.42	0.46	High
Length of service as faculty				
10 years and below	29	3.45	0.43	High
More than 10 years	13	3.45	0.50	High
Length of service as seafarer				
10 years and below	14	3.54	0.43	High
More than 10 years	28	3.40	0.47	Moderate
Educational attainment				
Bachelor's Degree	27	3.40	0.44	Moderate
Master's Degree	11	3.48	0.47	High
Doctorate Degree	4	3.68	0.48	High

Scale of Means: 4.21 - 5.00 Very High; 3.41 - 4.20 High; 2.61 - 3.40 Moderate; 1.81 - 2.60 Low; 1.00 - 1.80 Very Low

3.1.3 Creativity and innovation skills

When taken as a whole, the maritime faculty in this investigation exhibited a high level of skills in 21st century learning in terms of creativity and innovation skills, with an obtained overall mean score of 3.50. A scrutiny of the means in the same table revealed that maritime faculty obtained the highest mean score indicating that they promote a variety of creative perspectives (M = 3.55), and they elaborate and improve on ideas (M = 3.54), described as high.

However, the items of the questionnaire which obtained the two lowest means indicate that they create new, unique, surprising products (M = 3.46), and they combine different elements into a complete product (M = 3.48), described as high. This means that the maritime faculty skillfully promotes creativity and elaborates and improves students' ideas.

Table 7 presents the maritime faculty's 21st century learning skills in terms of creativity and innovation when taken as a whole.

Table 7 Level of maritime faculty's 21st century learning skills in terms of creativity and innovation skills, when taken as a whole.

Category	Mean	Description
I promote a variety of creative perspectives.	3.55	High
I elaborate and improve on ideas.	3.54	High
I use brainstorming to generate original ideas.	3.53	High
I find sources of information and inspiration when others do not.	3.50	High
I use creativity and imagination.	3.49	High
I create ideas geared to the intended client or use.	3.49	High
I combine different elements into a complete product.	3.48	High
I create new, unique, surprising products.	3.46	High
Overall Mean	3.50	High

Scale of Means: 4.21 - 5.00 Very High; 3.41 - 4.20 High; 2.61 - 3.40 Moderate; 1.81 - 2.60 Low; 1.00 - 1.80 Very Low

The maritime faculty's 21st century learning skills are high when classified according to age, civil status, length of service as faculty, length of service as seafarer, and educational attainment. However, maritime faculty who are 40 years old and below, single, with more than 10 years of service as faculty, with 10 years and below of service as seafarer, and a Master's degree holder have higher level of 21st century learning skills as compared to their counterparts, with obtained mean scores of 3.64, 3.72, 3.50, 3.59, and 3.54, respectively. The above findings indicate that, regardless of the profile of the maritime faculty, they are skillful in 21st century learning in terms of creativity and innovation skills.

Table 8 presents the level of maritime faculty's 21st century learning skills in terms of creativity and innovation when classified as to variables.

Table 8 Level of maritime faculty's 21st century learning skills in terms of creativity and innovation, when classified as to variables.

Variables	N	Mean	SD	Description
As a whole	42	3.47	0.51	High
Age				
40 years old and below	9	3.64	0.47	High
More than 40 years old	33	3.46	0.49	High
Civil status				
Single	6	3.72	0.39	High
Married	36	3.48	0.49	High
Length of service as faculty				
10 years and below	29	3.51	0.46	High
More than 10 years	13	3.50	0.54	High
Length of service as seafarer				
10 years and below	14	3.59	0.49	High
More than 10 years	28	3.45	0.49	High
Educational attainment				
Bachelor's Degree	27	3.46	0.46	High
Master's Degree	11	3.54	0.52	High
Doctorate Degree	4	3.50	0.56	High

Scale of Means: 4.21 - 5.00 Very High; 3.41 - 4.20 High; 2.61 - 3.40 Moderate; 1.81 - 2.60 Low; 1.00 - 1.80 Very Low

3.1.4 Communication and media fluency skills

When taken as a whole, the maritime faculty in this investigation exhibited a "High" level of 21st century learning skills in terms of communication and media fluency skills, with an obtained

overall mean score of 3.56. A scrutiny of the means in the same table reveals that maritime faculty obtained the highest mean score indicating that they answer questions clearly and concisely (M = 3.65), and they speak clearly and professionally (M = 3.62), described as high.

However, the items of the questionnaire which obtained the two lowest means indicate that they clearly communicate alternative or opposing perspectives (M = 3.53), and they use appropriate body language when presenting (M = 3.46), described as high. This means that the faculty skillfully deliver instruction with clarity and professionally among students equipped with 21st century learning skills.

Table 9 presents the level of maritime faculty's 21st century learning skills in terms of communication and media fluency skills, when taken as a whole.

Table 9 Level of maritime faculty's 21st century learning skills in terms of communication and media fluency skills, when taken as a whole.

Category	Mean	Description
I answer questions clearly and concisely.	3.65	High
I speak clearly and professionally.	3.62	High
I organize information well.	3.58	High
I create a clear and interesting introduction and conclusion.	3.56	High
I present all information clearly, concisely, and logically.	3.56	High
I use appropriate media to enhance understanding.	3.55	High
I clearly communicate alternative or opposing perspectives.	3.53	High
I adapt a communication style appropriate for the purpose, task, or audience.	3.52	High
I use appropriate body language when presenting.	3.46	High
Overall Mean	3.56	High

Scale of Means: 4.21 - 5.00 Very High; 3.41 - 4.20 High; 2.61 - 3.40 Moderate; 1.81 - 2.60 Low; 1.00 - 1.80 Very Low

Table 10 Level of maritime faculty's 21st century learning skills in terms of communication and media fluency skills, when classified as to variables.

Variables	N	Mean	SD	Description
As a Whole	42	3.52	0.52	High
Age				
40 Years Old and Below	9	3.69	0.41	High
More than 40 years old	33	3.52	0.47	High
Civil status				
Single	6	3.77	0.38	High
Married	36	3.53	0.46	High
Length of service as faculty				
10 years and below	29	3.57	0.43	High
More than 10 years	13	3.54	0.50	High
Length of service as seafarer				
10 years and below	14	3.69	0.40	High
More than 10 years	28	3.47	0.48	High
Educational attainment				
Bachelor's Degree	27	3.51	0.46	High
Master's Degree	11	3.61	0.48	High
Doctorate Degree	4	3.70	0.37	High

Scale of Means: 4.21 - 5.00 Very High; 3.41 - 4.20 High; 2.61 - 3.40 Moderate; 1.81 - 2.60 Low; 1.00 - 1.80 Very Low

The maritime faculty's 21st century learning skills are high when classified according to age, civil status, length of service as faculty, length of service as seafarer, and educational attainment. However, maritime faculty who are 40 years old and below, single, with 10 years and below of service

as faculty, with 10 years and below of service as seafarer, and a doctorate degree holder have higher level of 21st century skills as compared to their counterparts, with obtained mean scores of 3.69, 3.77, 3.57, 3.69, and 3.70, respectively. The above findings indicate that, regardless of the profile of the maritime faculty, they are skillful in 21st century learning in terms of communication and media fluency skills.

Table 10 presents the level of maritime faculty's 21st century learning skills in terms of communication and media fluency skills, when classified as to variables.

3.2 Differences in the 21st century learning skills of maritime faculty

3.2.1 Collaboration, teamwork, and leadership skills

As shown in Table 10, the Mann-Whitney U Test results reveal that no significant differences exist in the level of maritime faculty's 21st century learning skills in terms of collaboration, teamwork, and leadership skills, when classified according to age ($U = 736.00$, $p > 0.05$), civil status ($U = 395.50$, $p > 0.05$), length of service as faculty ($U = 1{,}159.00$, $p > 0.05$), and length of service as a seafarer ($U = 953.00$, $p > 0.05$). These results imply that, regardless of personal variables, maritime faculty members have a similar level of 21st century skills in terms of collaboration, teamwork, and leadership skills.

Table 11 presents the differences in the level of maritime faculty's 21st century learning skills in terms of collaboration, teamwork, and leadership skills, when classified according to age, civil status, length of service as faculty, and length of service as seafarer.

Table 11 Significant differences in the level of maritime faculty's 21st century learning skills in terms of collaboration, teamwork, and leadership skills when classified according to age, civil status, length of service as faculty, and length of service as seafarer.

Variables	Mean Rank	U-test value	p-value	Remarks
Age				
Young	57.92	736.000	0.144	Not Significant
Old	48.16			
Civil status				
Single	61.54	395.500	0.153	Not Significant
Married	48.99			
Length of service as faculty				
Short				
Long	50.19	1,159.000	0.891	Not Significant
Length of service as seafarer	51.00			
Short				
Long				
	56.56	953.000	0.089	Not Significant
	46.62			

$p < 0.05$, Significant, $p > 0.05$, Not Significant

Kruskal-Wallis H Test results in **Table 12** show that no significant difference was found to exist in the level of maritime faculty's 21st century learning skills when classified according to educational attainment, $H = 0.205$, $p > 0.05$. This result suggests that the educational attainment does not influence the level of maritime faculty's 21st century learning skills.

Table 12 presents the differences in the level of maritime faculty's 21st century learning skills in terms of collaboration, teamwork, and leadership skills, when classified according to educational attainment.

Table 12 Significant differences in the level of maritime faculty's 21st century learning skills in terms of collaboration, teamwork and leadership skills, when classified according to educational attainment.

Variables	Mean Rank	H-value	p-value	Remarks
Educational attainment				
Bachelor's Degree	47.45			
Master's Degree	51.97	3.170	0.205	Not Significant
Doctorate Degree	65.28			

$p > 0.05$, Not Significant

3.2.2 Critical thinking and problem-solving skills

As shown in **Table 13**, the Mann-Whitney U Test results reveal that no significant differences exist in the level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills, when classified according to age ($U = 743.00$, $p > 0.05$), civil status ($U = 389.00$, $p > 0.05$), length of service as faculty ($U = 1142.50$, $p > 0.05$), and length of service as a seafarer ($U = 966.00$, $p > 0.05$). These results imply that, regardless of personal variables, maritime faculty members have a similar level of 21st century learning skills in terms of critical thinking and problem-solving skills.

Table 13 presents the differences in the level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills, when classified according to age, civil status, length of service as faculty, and length of service as seafarer.

Table 13 Significant differences in the level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills when classified according to age, civil status, length of service as faculty, and length of service as seafarer.

Variables	Mean Rank	U-test value	p-value	Remarks
Age				
Young	57.54	743.000	0.161	Not Significant
Old	48.28			
Civil status				
Male	62.08	389.000	0.129	Not Significant
Female	48.92			
Length of service as faculty				
Short	49.93	1,142.500	0.795	Not Significant
Long	51.43			
Length of service as seafarer				
Short	56.23	966.000	0.104	Not Significant
Long	46.84			

$p < 0.05$, Significant, $p > 0.05$, Not Significant

Kruskal-Wallis H Test results in **Table 14** show that no significant difference was found to exist in the level of maritime faculty's skills in 21st century learning skills when classified according to educational attainment, $H = 0.141$, $p > 0.05$. This result suggests that educational attainment does not influence the level of 21st century learning skills in terms of critical thinking and problem-solving skills.

Table 14 presents the differences in the level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills, when classified according to educational attainment.

Table 14 Significant differences in the level of maritime faculty's 21st century learning skills in terms of critical thinking and problem-solving skills when classified according to educational attainment.

Variables	Mean Rank	H-value	p-value	Remarks
Educational attainment				
Bachelor's Degree	46.33			
Master's Degree	54.45	3.912	0.141	Not Significant
Doctorate Degree	63.78			

p > 0.05, Not Significant

3.2.3 Creativity and innovation skills

As shown in **Table 15**, the Mann-Whitney U Test results reveal that no significant differences exist in the level of maritime faculty's 21st century learning skills in terms of creativity and innovation skills when classified according to age (U = 740.50, p > 0.05), civil status (U = 389.50, p > 0.05), length of service as faculty (U = 1154.50, p > 0.05), and length of service as a seafarer (U = 979.50, p > 0.05). These results imply that, regardless of personal variables, maritime faculty members have a similar level of 21st century learning skills in terms of creativity and innovation skills.

Table 15 presents the differences in the level of maritime faculty's 21st century learning skills in terms of creativity and innovation skills, when classified according to age, civil status, length of service as faculty, and length of service as seafarer.

Table 15 Significant differences in the level of maritime faculty's 21st century learning skills in terms of creativity and innovation skills when classified according to age, civil status, length of service as faculty, and length of service as seafarer.

Variables	Mean Rank	U-test value	p-value	Remarks
Age				
Young	57.65	740.500	0.149	Not Significant
Old	48.24			
Civil status				
Single	62.04	389.500	0.126	Not Significant
Married	48.93			
Length of service as faculty				
Short	50.12			
Long	51.12	1,154.500	0.862	Not Significant
Length of service as seafarer				
Short				
Long	55.88			
	47.06	979.500	0.122	Not Significant

p < 0.05, Significant, p > 0.05, Not Significant

Kruskal-Wallis H Test results in **Table 16** show that no significant difference was found to exist in the level of maritime faculty's 21st century learning skills when classified according to educational attainment, H = 0.319, p > 0.05. This result suggests that educational attainment does not influence the level of 21st century learning skills in terms of creativity and innovation skills.

Table 16 presents the differences in the level of maritime faculty's 21st century learning skills in terms of creativity and innovation skills, when classified according to educational attainment.

Table 16 Significant differences in the level of maritime faculty's 21st century learning skills in terms of creativity and innovation skills, when classified according to educational attainment.

Variables	Mean Rank	H-value	p-value	Remarks
Educational attainment				
Bachelor's Degree	47.69			
Master's Degree	52.44	2.287	0.319	Not Significant
Doctorate Degree	62.00			

$p > 0.05$, Not Significant

3.2.4 Communication and Media Fluency Skills. As shown in **Table 17**, the Mann-Whitney U Test results reveal that significant difference existed in the level of maritime faculty's 21st century learning skills in terms of communication and media fluency skills when classified to the length of service as a seafarer ($U = 875.50$, $p < 0.05$). This result implies that length of service as seafarer influences the level of 21st century skills in terms of communication and media fluency skills.

On the other hand, no significant differences exist in the level of 21st century skills when classified according to age ($U = 722.50$, $p > 0.05$), civil status ($U = 374.00$, $p > 0.05$), and length of service as faculty ($U = 1175.00$, $p > 0.05$. These results imply that, regardless of personal variables, maritime faculty members have a similar level of 21st century skills in terms of communication and media fluency.

Table 17 presents the differences in the level of maritime faculty's 21st century learning skills in terms of communication and media fluency skills, when classified according to age, civil status, length of service as faculty, and length of service as seafarer.

Table 17 Significant differences in the level of maritime faculty's 21st century learning skills in terms of communication and media fluency skills, when classified according to age, civil status, length of service as faculty, and length of service as seafarer.

Variables	Mean Rank	U-test value	p-value	Remarks
Age				
Young	58.40	722.500	0.110	Not Significant
Old	48.01			
Civil status				
Single	63.33	374.000	0.088	Not Significant
Married	48.75			
Length of service as faculty				
Short	50.45			
Long	50.58	1,175.000	0.982	Not Significant
Length of service as seafarer				
Short				
Long	58.55			
	45.35	875.50	0.021	Significant

$p < 0.05$, Significant, $p > 0.05$, Not Significant

Kruskal-Wallis H Test results in **Table 18** show that no significant difference was found to exist in the level of maritime faculty's 21st century learning skills when classified according to educational attainment, $H = 0.440$, $p > 0.05$. This result suggests that educational attainment does not influence the level of maritime faculty's 21st century learning skills in terms of communication and media fluency skills.

Table 18 presents the differences in the maritime faculty's level of 21st century learning skills in terms of communication and media fluency skills, when classified according to educational attainment.

Table 18 Significant differences in the maritime faculty's level of 21st century learning skills in terms of communication and media fluency skills classified according to educational attainment.

Variables	Mean Rank	H-value	p-value	Remarks
Educational attainment				
Bachelor's Degree	47.77			
Master's Degree	53.27	1.642	0.440	Not Significant
Doctorate Degree	58.56			

$p > 0.05$, Not Significant

4. Discussion

The maritime faculty in the Province of Antique demonstrated a "high" level of 21st century learning skills in terms of: collaboration, teamwork, and leadership skills; critical thinking and problem-solving skills; creativity and innovation skills; and communication and media fluency skills when they are taken as a whole and when they are classified according to civil status and length of service as a faculty. It was further revealed that maritime faculty aged below 40 years old, with more than 10 years of seafaring experience, and a Bachelor graduate, had a moderate level of 21st century learning skills in terms of collaboration, teamwork, and leadership skills, as well as critical thinking and problem-solving skills.

Furthermore, a significant difference was found to exist in the level of maritime faculty's 21st century learning skills when grouped according to the length of service as a seafarer. The communication and media fluency skills, rated by maritime faculty with short and long seafaring experience, differed significantly. However, there was no significant difference in the level of 21st century learning skills of maritime faculty in terms of: collaboration, teamwork, and leadership skills; critical thinking and problem-solving skills; and creativity and innovation skills when grouped according to age, civil status, length of service as faculty, length of service as a seafarer, and educational attainment. Further, in terms of communication and media skills of maritime faculty, no significant difference was found to exist when they were grouped according to age, civil status, length of service as faculty, and length of service as a seafarer.

This finding supports the study of Jan (2017), which revealed that 21st century teachers need teaching skills, content mastery, and the ability to integrate teaching with technology. A similar result from the study of Fatimah (2017), which revealed that technology creates an effective learning experience and encourages teachers to use instructional media that provide for the needs of the learners in the 21st century.

5. Conclusions and recommendations

The maritime faculty demonstrated a high level of competence and skills in employing 21st century learning skills in terms of collaboration, teamwork, and leadership skills; critical thinking and problem solving; creativity and innovation; and communication and media fluency skills in teaching and learning. They can continue to update their skills by attending a series of training, capability-building seminars, and other related activities to keep up with the demands of 21st century teaching and learning.

However, younger respondents had moderate skills in terms of collaboration, teamwork, and leadership. This is probably because older respondents, in general, may have gained a lot of seafaring experience that greatly contributes to their teaching methodologies and strategies essential to the 21st century classroom, whereas younger respondents are still in the process of learning, practicing, and adapting to the new demands of the 21st century classroom.

Further, experienced seafarers had moderate critical thinking and problem-solving skills. This is probably because they spent most of their time at sea, only follow the daily routine tasks assigned to them, stick to the traditional ways of doing things without considering other alternatives, and resist any change, including new technologies essential to 21st century learning. Less experienced seafarers are still in the process of learning new things, tend to be open to any suggestion, consider alternative options, and explore effective strategies to improve their 21st century learning skills.

Furthermore, Bachelor's degree holders also shared a moderate level of critical thinking and problem-solving skills. This is probably because Bachelor's degree holders had limited exposure in academic engagement, thus, provide basic knowledge, understanding, and practical skills on various teaching methodologies and strategies, while Master's and Doctoral degree holders demonstrated a depth, comprehensive understanding, and mastery of 21st century skills that contribute to effective teaching and learning engagement in the 21st century classroom.

The level of 21st century learning skills among maritime faculty with longer seafaring experience and those with shorter seafaring experience differed significantly. Maritime faculty with shorter seafaring experience were more skilled in applying these 21st century learning methods, because they adapted new teaching methods, known as being tech-savvy, incorporated technology in teaching, engaged in professional development, and were open to change that improved their teaching. While maritime faculty with longer seafaring experience may lack sufficient training in 21st century skills that help improve their teaching methodologies and strategies, they may also not be open to any change to improve their skills; they are considered digital immigrants who are less comfortable with technology, and solely rely on traditional teaching methods. On the other hand, maritime faculty in this study have the same level of 21st century learning skills in terms of collaboration, teamwork, and leadership skills; critical thinking and problem-solving skills; and creativity and innovation skills, regardless of their age, civil status, length of service as faculty, length of service as a seafarer, and educational attainment. They also shared the same level of 21st-century learning skills in terms of communication and media fluency, regardless of age, civil status, length of service as faculty, and educational attainment.

The concerned Maritime Higher Education Institutions (MHEIs) may hire high-quality teaching applicants with mastery of maritime education, good communication skills, and with computer literacy skills, and support the professional development of its faculty members. Also, they may integrate into the maritime curriculum 21st century learning skills, namely collaboration, teamwork, and leadership skills; critical thinking and problem-solving skills; creativity and innovation skills; and communication and media fluency skills. Further, they may provide the faculty members and students with adequate internet facilities to deliver different learning modalities. The management of the schools may provide adequate infrastructure to establish flexible learning, mainly internet facilities. Furthermore, they may access new technology, innovative teaching, and assessment methods. Finally, they may develop the teaching skills of faculty members, focusing on the following 21st century skills, namely collaboration, teamwork, and leadership skills, critical thinking, and problem-solving skills, creativity, and innovation skills, and communication and media fluency skills. These recommendations are aligned with the United Nations' Sustainable Development Goals (SDG) 2030: SDG 4 Quality Education.

Acknowledgements

The researchers would like to express their gratitude to the following individuals and maritime institutions who helped them with the success of this article: Dr. Geoffrey P. Basilio for his suggestions for the improvement of the study; maritime faculty members from the University of Antique and Saint Anthony's College for their support in accomplishing the study; the University of Antique and Saint Anthony's College administrations for allowing us to gather data from their respective schools; their family and friends for their support throughout the conduct of the study; and Almighty God for His provision of wisdom, guidance, and protection

References

Chico, P. C. (2018). *Embracing changes and challenges of 21st century learning*. Sun Star Pampanga. Retrieved from https://www.pressreader.com

Commission on Higher Education. (2018). *Enrolment for BS Marine Engineering and BS Marine Transportation by Gender*. Maritime Industry Authority (MARINA) Statistical Report 2013-2017.

Creighton, T. B. (2018). *Digital natives, digital immigrants, digital learners: An international empirical integrative review of the literature*. ICPEL Education Leadership Review.

Dahalan, S. C., Ahmad, A. R., & Awang, M. M. (2020). The effectiveness of the 21st century teaching history module (21-Cthm) towards high order thinking skills. *International Journal of Innovation, Creativity and Change, 12*(11), 106-120.

Department Memorandum No. 2020-0055. (2020). *Interim guidelines on 2019 novel coronavirus acute respiratory disease (2019-nCoV ARD) response in schools and higher education institutions.* Department of Health Philippines. Retrieved from https://doh.gov.ph/sites/default/files/health-update/DC2020-0042-Reiteration-of-DM2020-0055-Interim-Guidelines-on-2019-nCoV-ARD-Response-in-Schools-Higher-Education-Institutions.pdf

Estimo, E. (2020). Ship to academe, seafaring to teaching: Seafarer teachers in maritime higher education institutions in the Philippines. *Higher Education Research, 5*(2), 44-51. https://doi.org/10.11648/j.her.20200502.12

Fatimah, A. S., & Santiana, S. (2017). *Teaching in 21st century: Students-teachers' perceptions of technology use in the classroom. Journal of Linguistic and English Teaching, 2*(2), 125-135. https://doi.org/10.24903/sj.v2i2.132

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education* (8th eds.). New York, NY: McGraw-Hill.

Galicia, P. R. B. (2021). Authentic assessment and academic performance of marine transportation students at the university of Antique, Philippines. *Australian Journal of Maritime & Ocean Affairs, 14*(4), 251-260. https://doi.org/10.1080/18366503.2021.1962081

Galicia, P. R. B. (2022). Authentic assessment and academic performance of Marine Engineering students: A correlational study. *Maritime Technology and Research, 4*(3), 254984. https://doi.org/10.33175/mtr.2022.254984

International Maritime Organization. (2019). *International convention on standards of training, certification and watchkeeping for seafarers, 1978.* International Maritime Organization (IMO). Retrieved from https://www.imo.org/en/OurWork/HumanElement/Pages/STCW-Convention.aspx

Jan, H. (2017). Teachers of 21st century: Characteristics and development. *Research on Humanities and Social Sciences, 7*(9), 50-54.

Jarrahi, M. H., & Eshraghi, A. (2019). Digital natives vs. digital immigrants: A multidimensional view on interaction with social technologies in organizations. *Journal of Enterprise Information Management, 32*(6), 1051-1070. https://doi.org/10.1108/JEIM-04-2018-0071

Kelley, T. R., Knowles, J. G., Han, J., & Sung, E. (2019). Creating a 21st century skills survey instrument for high school students. *American Journal of Educational Research, 7*(8), 583-590. https://doi.org/10.12691/education-7-8-7

Martirez, R. C. (2019). *Teachers' capabilities in the 21st century skills among maritime higher education institutions in Region VI: Basis for training resource framework* (Ph. D. Dissertation). Doctor of Philosophy in Maritime Education (Curriculum and Assessment). John B. Lacson Foundaiton Maritime University (Arevalo), Iloilo City.

Mills, G. E., & Gay, L. R. (2019). *Educational research: Competencies for analysis and application Twelve Edition.* Pearson Educational Book.

Mystkowska-Wiertelak, A., & Pawlak, M. (2012). *Production-oriented and comprehension-based grammar teaching in the foreign language classroom*. New York: Springer. https://doi.org/10.1007/978-3-642-20856-0

Odabaşı, H. F., Akyol Emmungil, E., Atabay, E., & Demir, M. D. (2023). A critical overview of Turkish research on 21st century skills in education: 2017-2022. *Qualitative Inquiry in Education: Theory & Practice, 1*(1), 29-49. https://doi.org/10.59455/qietp.3

Philippine Overseas Employment Agency. (2016). *Revised POEA rules and regulations governing the recruitment and employment of seafarers.* POEA. Retrieved from: https://poea.gov.ph/laws&rules/files/2016%20Rules%20Seabased.pdf

Ruettgers, M. (2016). Teacher preparation: 21st century skills and knowledge required. *Journal of Education Leadership in Action, 4*(1), 4. https://doi.org/10.62608/2164-1102.1062

Sarinas, B. G. S. (2019). Education and competitiveness: How maritime university students perceived their 21st century learning skills. *Augustinian, 20*(1), 14790.

Sharma, A., & Kim, T. E. (2021). Exploring technical and non-technical competencies of navigators for autonomous shipping. *Maritime Policy & Management, 49*(6), 831-849. https://doi.org/10.1080/03088839.2021.1914874

Taie, M. (2014). Skill acquisition theory and its important concepts in SLA. *Theory and Practice in Language Studies, 4*(9), 1971-1976. https://doi.org/10.4304/tpls.4.9.1971-1976