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Case Study of Compare Maritime and Ocean Educational Style for under MET

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ABSTRACT: As an island nation, the topic of training and sending out seafarers is a present challenge in Japan. Awareness activities for elementary, junior high, and senior high school students are essential for securing future mariner job candidates. In this study, we conducted maritime and marine educational methods using various procedures to raise awareness about previous maritime industries. We also brought in maritime specialists for junior high school students who will be continuing to maritime educational institutions, and conducted a comparative study of the results. In this study, we compared three types of educational content: lectures on leadership techniques, observational field trips, and hands-on lessons. The results showed that students had the highest interest in the hands-on lessons, followed by observational field trips, then finally the lectures. These results demonstrated that when creating class content for maritime and marine education, this should be adapted to the identity of the young people who are to receive that education.

1 INTRODUCTION

As an island nation, Japan has the challenge of securing a continual supply of mariners to ensure stable marine transport. As shown in Figure 1, there were more than 50,000 ocean mariners in the 1970s, but by 2017, this number had dropped to about 2,200 [22]. Japan depends on foreign resources. The country has done as much as possible to train and secure mariners from the viewpoint of security since before the Second World War. By the 1940s, awareness of the issue of a maritime specialist shortage was pointed out by maritime transportation companies in Japan[13]. Based on this awareness, the Japanese government included "the familiarization of maritime ideology" in its legislative system, and continues ocean and marine industry awareness activities for young people. Nevertheless, young people's understanding of the occupation of mariners has not improved, and the demand for human resources is not currently being met.

To spread awareness of the ocean and marine-related occupations among young people, cooperation with elementary, junior high, and senior high schools is needed. The national education system in Japan is sorted into three sections by the School Education Act: elementary education focusing on elementary schools, secondary education focusing on junior and senior high schools, and the higher education system that focuses on universities. Japan's national formal education system has formulated the General Policies Regarding Curriculum Formulation for school classification based on the School Education Act. Furthermore, based on the General Policies Regarding Curriculum Formulation, publishing companies create textbooks, which are then published after being reviewed by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Each school selects textbooks based on the teaching plans of the teachers in charge of the lessons.

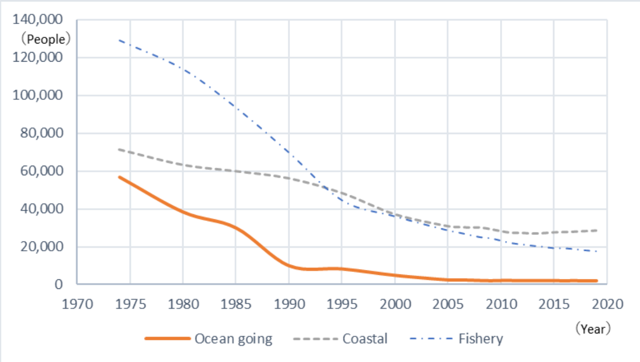
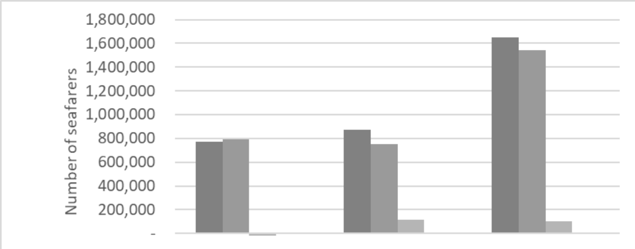


Figure 1. Shift in the Number of Japanese Mariners [22]



	Officers	Ratings	Total
Supply	774,000	873,500	1,647,500
Demand	790,500	754,500	1,545,000
Shortage/Surplus	-16,500	119,000	102,500
%	2.1%	15.8%	11.7%

Figure2 Current estimated global supply and demand of Mariners [3]

On December 12, 2016, the MEXT Central Council for Education issued a report to the minister of MEXT on creating new general policies regarding curriculum formulation. The new general policies regarding curriculum formulation included many marine-related keywords based on strong demands from the marine industry and marine-related organizations. In the future, as specific textbooks and educational content are created, the challenge will be to establish effective educational instruction methods [21] and content that facilitate young people's (especially junior high school students) active interest in the ocean.

The feature of experience-based learning is that the experience of the students occupies core place in all considerations of teaching and learning. In this case, the rationale for career education is linked to the current transformations in the concepts and structures of lifestyle and of career, and the need to enable individuals to construct their career [1]. So, students need fields to analyze their experience by reflecting, evaluating and reconstructing, experience in order to draw meaning from it in the light of prior experience. These reviews of their experience may lead to further action [5].

Going forward, an important societal challenge will be to create a system and study the specific instructional methods through the educational efficacy of the contents as ocean-related education is carried out as part of formal education. This study compares the following instruction methods related to the ocean conducted in junior high schools: lecture education content, observatory education content, and hands-on education content.

2 EDUCATION'S CAREER DESIGN IMPLICATIONS

According to the Shannon-Weaver communication model, for a sender to smoothly transmit information to a receiver, the sender must transmit the information in a way aligned with the receiver's reception ability and interest [25]. The information receiver's interest plays a part in their advantages and disadvantages, or something that responds to their ability to receive. Considering educational activities as communication, instructors as senders of information need to provide educational content in a form that is easy for students as information receivers to understand. In this context, career design emerges as an issue in which students have a great deal of interest. For example, junior high school students form their own careers gradually, considering future plans to continue to high school or university, or to search for jobs. Therefore, students have an interest in information about their next place of education as part of preparing for career formation and determining what they must do to orient themselves for their next level of education or employment (bibliographic data). It is essential that educational content makes it easy for these students to create a mental image of the information related to their interests [20]. Watts suggests for career education is linked to the current transformations in the structures of work and of career, and the need to enable individuals not to choose but to construct their career. He approached to compare current career education in European countries based on as timing, content, method, models of delivery, progression and assessment [1]. Parisa's approached to compare for problem-based learning and lecture-based learning in the education styles of medical students. The students compared that were divided into problem-based learning group and lecture-based learning group by simple randomization. Students preferred problem-based learning over lecture-based learning, because of motivation, a higher performance of education. However, the difference was not statistically significant [19].

Educational content can be classified by approach as follows: hands-on content that requires student independence, observational content located between being independent and objective, and lecture content that is objective. Thus, we conducted a survey study of young people's orientations according to education format.

3 CONDUCTING MODEL LESSONS

For this survey, we conducted model lessons for four junior high school classes (4crass at random in Kobe city, 142 students in total). The model lessons were 50-minute blocks of time per class, and included hands-on, observational, and lecture content. After the lesson, the students were asked to complete a survey on the hands-on, observational, and lecture content.

The lesson was configured to include a "ship-handling simulator experience" in which several students were given roles in a squad as the hands-on content, "career design panel discussions "as the observational content, and "topics learned in maritime education institutions" as the lecture content.

After data collection, the statistical analysis was single liner regression using STATA 13.0 software. Differences were statistically significant if the P value was less than 0.05. Also, the survey items included a five-point evaluation scale for students to compare each educational format so that we could determine which obtained the most interest among the hands-on, observational, and lecture content sections.

4 RESULTS

This survey was conducted based on four items. The responses to each question were as follows:

4.1 *Educational Content Orientation (Lecture Type versus Hands-On Type)*

The following five-point scale was used to determine whether there was more interest in the lecture-type or hands-on educational content: "Prefer Lecture," "Somewhat Prefer Lecture," "No Preference," "Somewhat Prefer Hands-On," "Prefer Hands-On."

Of the 142 students, 1 response was incomplete among the 141 responses collected. The number of replies for this question was as follows: "Prefer Lecture"(3), "Somewhat Prefer Lecture" (6), "No Preference" (19), "Somewhat Prefer Hands-On" (30), and "Prefer Hands-On"(83). Comparing the lecture and hands-on content, 9 students were oriented toward the lecture type (6.4%), 113 toward the hands-on type (80.1%), and 19 students had no preference (13.5%). This shows that the hands-on educational content was preferred 12.6 times more than the lecture educational content. Figure 3 provides the survey results by class.

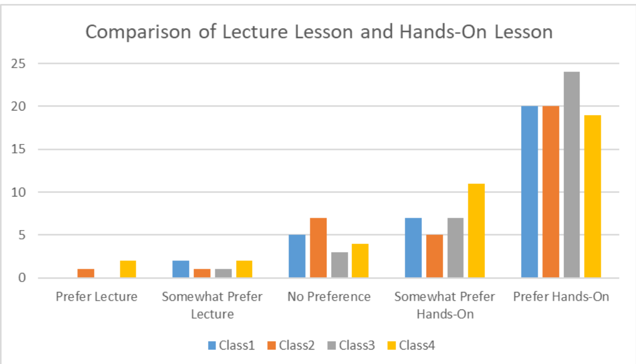


Figure 3. Comparison: Lecture Type versus Hands-On Type

4.2 *Educational Content Orientation (Lecture Type versus Observational Type)*

The next question was measured on the following five-point scale to determine whether there was more interest in the lecture-type educational content or observational educational content: "Prefer Lecture," "Somewhat Prefer Lecture," "No Preference," "Somewhat Prefer Observation," and "Prefer Observation."

Of the 142 students, 3 responses were incomplete among the 139 responses collected. The number of replies for this question was as follows: "Prefer Lecture" (7), "Somewhat Prefer Lecture" (10), "No Preference" (21), "Somewhat Prefer Observation" (21), and "Prefer Observation" (69). Comparing the lecture and observational content, 17 students were oriented toward the lecture type (12.2%), 101 students toward the observational type (72.7%), and 21 students had no preference (15.1%). This shows that the observational educational content had 5.9 times more support than the lecture educational content. Figure 4 provides the survey results by class.

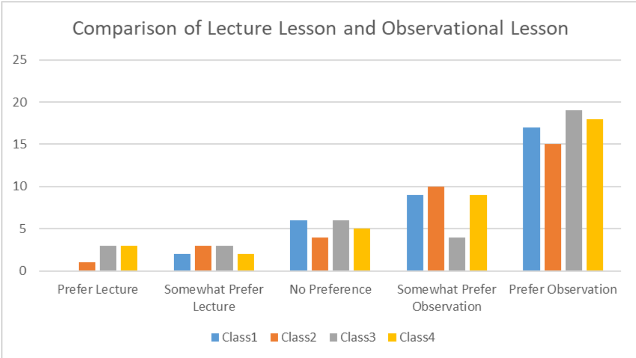


Figure 4. Comparison: Lecture Type versus Observational Type

4.3 *Educational Content Orientation (Hands-On Type versus Observational Type)*

The next question was measured on the following five-point scale to determine whether there was more interest in the hands-on type educational content or observational educational content: "Prefer Hands-On," "Somewhat Prefer Hands-On," "No Preference," "Somewhat Prefer Observation," and "Prefer Observation."

Of the 142 students, 3 responses were incomplete among the 139 responses collected. The number of replies for this question was as follows: "Prefer Hands-On" (57), "Somewhat Prefer Hands-On" (34), "No Preference" (24), "Somewhat Prefer Observation" (9), and "Prefer Observation" (15). Comparing the hands-on and observational content, 91 students were oriented toward the hands-on type (65.5%), 24 toward the observational type (17.3%), and 24 students had no preference (17.3%). This shows that the hands-on educational content had 3.8 times more support than the observational educational content. Figure 5 provides the survey results by class.

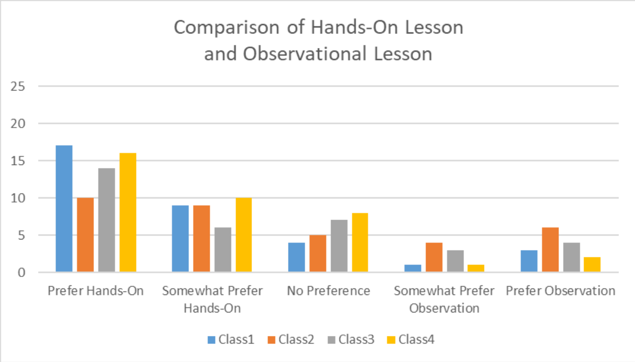


Figure 5. Comparison: Hands-On Type versus Observational Type

4.4 *Extraction and Comparison of Each Lesson Type*

These data comparison, the statistical analysis was single liner regression between "Lecture Type and Hands-On Type", "Lecture Type and Observational Type" and "Hands-On Type and Observational Type".

Figure6 plotted comparison data "Lecture Type and Hands-On Type" versus "Lecture Type and Observational Type". These statics result put on Table1 and Table2. In this result, parameter are correlation coefficient 0.353, t value 5.34 and P value 0. The difference was statistically significant.

Figure7 plotted comparison data "Lecture Type and Observational Type" versus "Hands-On Type and Observational Type". These statics result put on Table3 and Table4. In this result, parameter are correlation coefficient -0.04, t value -0.54 and P value 0.589. It did not find correlation form this difference.

Figure8 plotted comparison data "Lecture Type and Hands-On Type" versus "Hands-On Type and Observational Type". These statics result put on Table5 and Table6. In this result, parameter are correlation coefficient -0.18, t value -2.9 and P value 0.004. It did not find enough correlation form this difference.

Based on the results of the comparison of each lesson type in questions 1 through 3, we extracted the number of people for each lesson type after excluding the "No Preference" responses. The results indicated that 26 students from all classes preferred the "lecture type lesson," 204 students from all classes the "hands-on type lesson," and 125 students from all classes the "observational type lesson." Furthermore, converting the number of responses for each lesson into orientation rates based on the number of students, 9.2% of all classes preferred the "lecture type lesson," 71.8% the "hands-on type lesson," 44.0% the "observational type lesson," and 23.5% had "no preference." Figure 5 is a histogram according to educational content, and Figure 6 shows a radar chart of the orientation rates for the educational content.

Table 1. Liner regression: "Lecture Type and Hands-On Type" versus "Lecture Type and Observational Type"

Lec_and_Hans	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Lec_and_Obs	.3526402	.0659952	5.34	0.000	.2221393	.4831411
_cons	2.866644	.2783664	10.30	0.000	2.316194	3.417095

Table 2. Result: "Lecture Type and Hands-On Type" versus "Lecture Type and Observational Type"

	Lec_and_Hans
Lec_and_Obs	0.353***
	(5.34)
_cons	2.867***
	(10.30)
N	139

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 3. Liner regression: "Lecture Type and Observational Type" versus "Hands-On Type and Observational Type"

Lec_and_Obs	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Hans_and_Obs	-.0410779	.0758947	-0.54	0.589	-.1911743	.1090184
_cons	4.127348	.196138	21.04	0.000	3.739447	4.515248

Table 4. Result "Lecture Type and Observational Type" versus "Hands-On Type and Observational Type"

	Lec_and_Obs
Hans_and_Obs	-0.0411
	(-0.54)
_cons	4.127***
	(21.04)
N	137

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

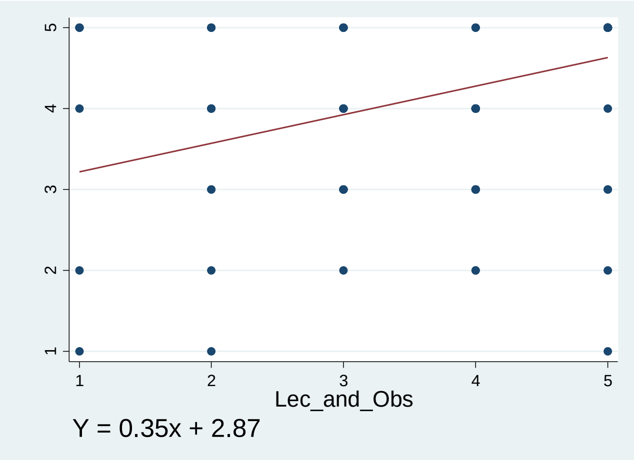
Table 5. Liner regression: "Lecture Type and Hands-On Type" versus "Hands-On Type and Observational Type"

Lec_and_Hans	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Hans_and_Obs	-.1803504	.0620986	-2.90	0.004	-.3031461	-.0575548
_cons	4.708978	.1604531	29.35	0.000	4.391693	5.026263

Table 6. Result "Lecture Type and Hands-On Type" versus "Hands-On Type and Observational Type"

	Lec_and_Hans
Hans_and_Obs	-0.180**
	(-2.90)
_cons	4.709***
	(29.35)
N	139

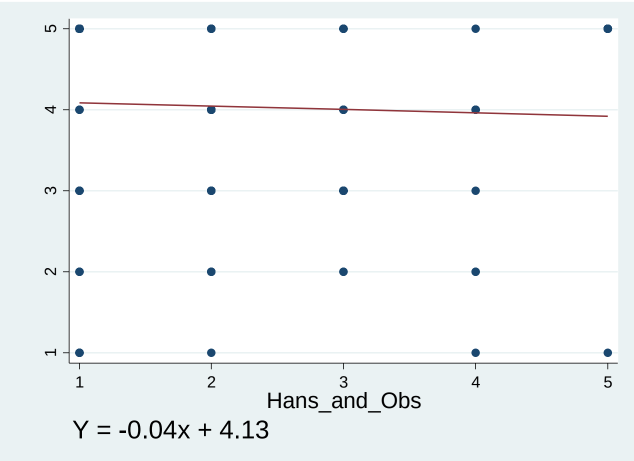
t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001



X axis: 1=Prefer Lecture Type, 2=Somewhat Prefer Lecture Type, 3=No Preference, 4=Somewhat Prefer Observational Type, 5=Prefer Observational Type

Y axis: 1=Prefer Lecture Type, 2=Somewhat Prefer Lecture Type, 3=No Preference, 4=Somewhat Prefer Hands-on Type, 5=Prefer Hands-on Type

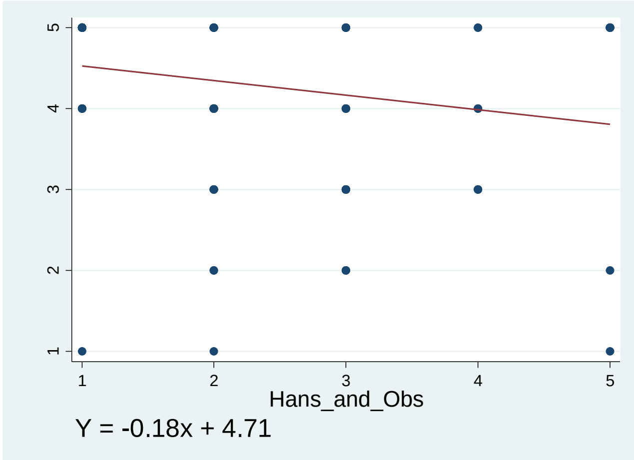
Figure 6. Scatter plot: "Lecture Type and Hands-On Type" versus "Lecture Type and Observational Type"



X axis: 1=Prefer Hands-on Type, 2=Somewhat Prefer Hands-on Type, 3=No Preference, 4=Somewhat Prefer Observational Type, 5=Prefer Observational Type

Y axis: 1=Prefer Lecture Type, 2=Somewhat Prefer Lecture Type, 3=No Preference, 4=Somewhat Prefer Observational Type, 5=Prefer Observational Type

Figure 7. Scatter plot: "Lecture Type and Observational Type" versus "Hands-On Type and Observational Type"



X axis: 1=Prefer Hands-on Type, 2=Somewhat Prefer Hands-on Type, 3=No Preference, 4=Somewhat Prefer Observational Type, 5=Prefer Observational Type

Y axis: 1=Prefer Lecture Type, 2=Somewhat Prefer Lecture Type, 3=No Preference, 4=Somewhat Prefer Hands-on Type, 5=Prefer Hands-on Type

Figure 8. Scatter plot: "Lecture Type and Hands-On Type" versus "Hands-On Type and Observational Type"

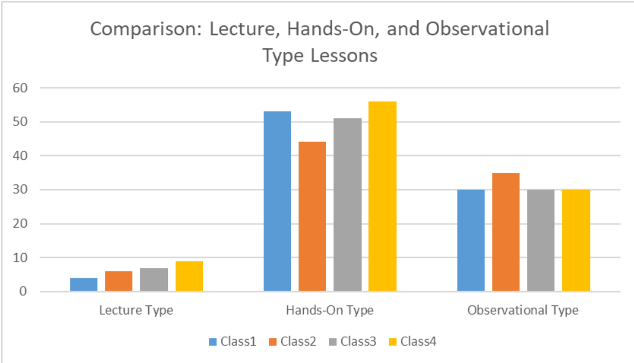


Figure 6. Extractions of Each Lesson Type

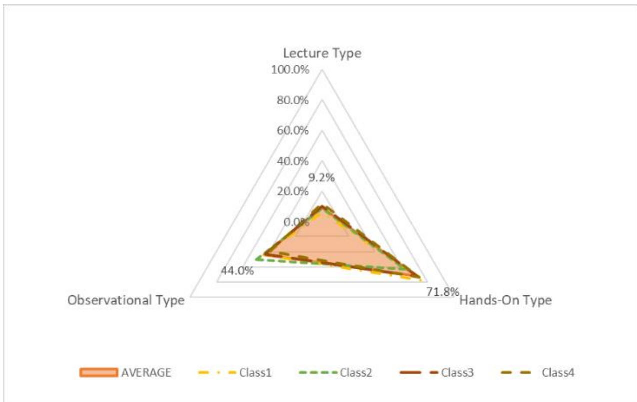


Figure 7. Comparison of Young People's Orientation Toward Content

5 DISCUSSION

We consider the results of the model lessons according to the hypotheses. Question 1 shows students' orientation toward lecture-type and hands-on-type educational content based on the model lesson. The hypothesis was that students would take greater interest in the hands-on educational content, which required more independence, than the lecture educational content, which was more indirect. As mentioned in section 4.1, the hands-on educational content had 12.6 times more support than the lecture educational content, showing that hands-on educational content may yield better educational results than lecture educational content. It is speculated that this refers especially to content that acts on students' independence by having them experience the handling of a ship after forming squads and distributing roles.

Question 2 shows students' orientation toward lecture-type educational content and observational-type educational content. The hypothesis was that students would take a greater interest in the observational content, which required independence, than in the lecture content. As mentioned in section 4.2, the results showed that the observational content had 5.9 times more support than the lecture content, showing that the junior high school students were more interested in the observational content than the lecture content. It is speculated that this especially refers to content that acts on students' independence by having role models in the form of university students as career design examples. Furthermore, it is thought that using university students as lecturers stimulated students' independence in thinking about more familiar issues.

Question 3 shows students' orientation toward hands-on content and observational content. While both types of educational content require students' independence, the hypothesis was that the junior high school students would be more interested in the more strongly independent hands-on educational content than in the observational content. As mentioned in section 4.3, the hands-on educational content had 3.8 times more support than the observational content. This shows that junior high school students were more interested in the hands-on educational content than in the observational content. It is speculated that the hands-on content demonstrated a stronger orientation than the observational content, because it allowed students to directly internalize examples.

The number of people oriented toward each type of content is shown in Figure 6, and the relative rate of orientation in Figure 7. According to these results, interest in maritime educational content was oriented in the following order from highest to lowest: "Hands-On Content" (71.8%), "Observational Content" (44.0%), and "Lecture Content" (9.2%). With an eight-fold difference in interest level between "Hands-On Content" and "Lecture Content," it was clear that there was great interest in content that emphasized students' own independence.

"Lecture Type and Hands-On Type" versus "Lecture Type and Observational Type" difference was statistically significant in statical comparison results. This means, young people be able to have motivate to learning styles: "Hands-On Type "and "Observational style" more than "Lecture style", in marine sector. Also, these results were able to confirm Parisa's result that students preferred problem-based learning over lecture-based learning [19].

Based on these results, regarding educational content on maritime and marine topics for young people, junior high school students supported the content in the order of ""hands-on"" followed by ""observational"" and ""lecture"" type educational content. Here, the educational content supported was highly effective learning material based on student independence.

6 CONCLUSIONS

In particular, who highlighted using university students when conducting these model lessons, pointed out the importance of role models for career design. As students design their careers, the conditions in which they make decisions can quickly change. By reducing the age gap between students and instructors, the instructors understand students' conditions, and are thus able to provide content that encourages student independence [26].

Maritime and marine education, which has until now been conducted through guest lectures by experienced captains or industry group officials, often has difficulty engaging the young people mind to career design, and consequently, has not yielded adequate results.

Brent suggests simulations, and other experience-based instructional methods have had a substantial impact on many problems of traditional instructional methods [4]. By conducting such empirical verification research, more effective and efficient marine education for young people will be possible.

The sustained development of marine stakeholder is a worldwide issue not limited to some countries and sectors. To secure the continued supply of marine stakeholder, activities to increase awareness of the ocean and marine industries are important for SDGs(Sustainable Development Goals) too. Thus, it is important to establish impactive "Hands-on" and "Observation" style educational content that easily earns their interest.

In the future, incorporates more maritime and marine education into basic education, it will be an urgent challenge to make a wide range of marine-related affairs easy for young people to understand. Going forward, it will be important to keep studying the content, coordinating methods, and specific instructional methods that lectors can use.

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