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Study on the Effects of Sailing Vessel Training

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Abstract: Sail training is thought to improve not only one's knowledge and skills with regard to vessel operation but also one's emotional competence, as manifested in improved leadership, self-control, and communication skills. We created a questionnaire in which trainees self-reported on their feelings and actions and used the results to assess their emotional competence in terms of eight items: self-control, leadership, situation awareness, communication, ability to be active, ability to manage stress, consideration for others, and teamwork. This questionnaire was administered to students before and after sailing vessel and motor ship training at a university. Of the eight items, seven (all except "consideration for others") showed improved scores after the sail training. Six of these seven items were improved to approximately equal degrees, and the seventh, "leadership", was remarkably improved. Scores for the seven emotional competence items that were improved by the sailing vessel training declined during the break of about 20 days that followed the training. They were improved again by the subsequent motor ship training, albeit to a lesser degree than by the sailing vessel training. In addition, since interesting results were obtained, we describe them.

Key words: sailing vessel training, motor ship training, university student, technical college student, training effect

1. Introduction

Sail training is thought to improve not only one's knowledge and skills with regard to vessel operation but also one's emotional competence, as manifested in improved leadership, self-control, and communications skills. Young trainees who participate in off-shore sail training programs show measurable improvements in social confidence and the ability to work with others, and these benefits are sustained over time after the voyage experience (Allison et al., 2007). The reported effects of sail training include individual benefits such as more positive thinking and increased confidence as well as group benefits such as capacity for teamwork (Inomata et al., 2012). We investigated trainees' Emotional Intelligence Quotient (EQ) as a measure of emotional competence and showed that seven items within EQ competency, including "positive thinking", "communication", "self-control", and "teamwork", were improved by sailing vessel training (Kunieda et al., 2014). Moreover, as sailing vessel training has been shown to improve creativity (Kunieda et al., 2014, 2015), we also performed a qualitative analysis of trainees' essays about their sail training experience.

Although the effect of sailing vessel training is being clarified little by little, there has been a tendency for time spent on sailing vessel training to be reduced in Japan in recent years. It is thought that sailing vessel training

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can enable individuals to master the knowledge and skills needed for vessel operation, and there is an improvement in emotional competence; however, there have been no studies carried out so far on these topics since it is difficult to appraise such knowledge and skills quantitatively. We asked trainees to perform a self-assessment by answering concrete questions, and we tried to show improvements in the trainees' emotional performance quantitatively. Lastly, we compared the emotional effects of sailing vessel and motor ship training between university students and technical college students.

2. Investigating Emotional Competence

The sail training vessel KaiwoMaru accepted 64 trainees from three schools, Tokyo University of Marine Science and Technology, Kobe University, and the Marine Technical College, for an ocean-going training voyage began in April 2015. Of these, 35 trainees from Tokyo University of Marine Science and Technology and Kobe University also completed an ocean-going training voyage on the motor training ship GingaMaru starting in July 2015. We administered a self-reported questionnaire survey on emotional competence to each of the 35 trainees who completed both the motor and sail training as well as to the 29 remaining trainees who completed only the sailing vessel training on KaiwoMaru. The same self-reported questionnaire survey was administered to 84 trainees from other technical colleges who had completed sail training on the training vessel Nippon Maru, which is the same type and size of ship as KaiwoMaru, starting in October 2015. Information on the university affiliations and trainings undergone by the trainees are provided in Table 1.

Table 1 Distribution of the Trainees by University and Training

	Tokyo University of Marine Science and Technology	Kobe University	Marine Technical College	Other Technical Colleges
Sailing vessel training on KaiwoMaru	18 (1)	17 (0)	29 (3)	-
Motor ship training on GingaMaru	18 (1)	17 (0)	-	43 (8)
Sailing vessel training on Nippon Maru	-	-	-	84 (12)

(): The number of female

The university students were 22 years old or older. The university students of Tokyo University of Marine Science and Technology and Kobe University received three months of sailing vessel training on KaiwoMaru, and three months of motor ship training on the GingaMaru after sailing vessel training. Since the age and boarding experience of the students of the Marine Technical College varied, we removed them from analysis this time. Forty-three technical college students who trained on the GingaMaru received motor ship training for three months after sailing vessel training for six months. Moreover, the other 84 technical college students who trained on the Nippon Maru received sailing vessel training for the first six months. And they received overseas voyage at six months of the second half. Almost of the technical college students of GingaMaru and Nippon Maru were 20 years old.

The questionnaire consisted of 80 items, including nine questions that measured competence in the following eight emotional characteristics: (1) self-control, (2) leadership, (3) situation awareness, (4) communication, (5) ability to be active, (6) ability to manage stress, (7) consideration for others, and (8) teamwork. The respondents responded using a four-point scale as follows: 4 = This statement is valid, 3 = It is somewhat valid, 2 = It is

somewhat invalid, and 1 = It is not valid at all. The eight emotional characteristics were measured based on the results of an investigation on social skill measurement for ship training (Sato et al., 2012) based on a veteran instructor's questionnaire. For example, we asked trainees to respond to the statement "Even if a sudden change of schedule occurs, you can respond appropriately without becoming panicked" as a concrete measure of self-control. As a concrete measure of leadership, we asked them to respond to the statement "You were able to complete your training successfully and to help teach your teammates". The entire self-assessment survey consisted of concrete questions about the skills acquired during onboard training.

3. Results and Discussion

3.1 Comparison of Sailing Vessel Training with Motor Ship Training

Figure 1 shows the results of the self-assessment survey conducted before and after sailing vessel training. Although there is little change in most of the eight items before and after the voyages, leadership was increased after the voyages by 3.39 points on an average. The result of the t-test was $p < 0.01$, indicating a significant difference. In contrast, the results of the surveys performed before and after motor ship training, which occurred after sailing vessel training (Figure 2), did not show any significant changes. Even though the trends are similar to those seen in connection with sailing vessel training and leadership did improve slightly, all differences were $p > 0.05$ in the t-test and, therefore, were insignificant. Moreover, although both sailing vessel training and motor ship training were associated with improvement in seven items, i.e., all except "consideration for others", no significant differences were seen anywhere except in "leadership" after sailing vessel training.

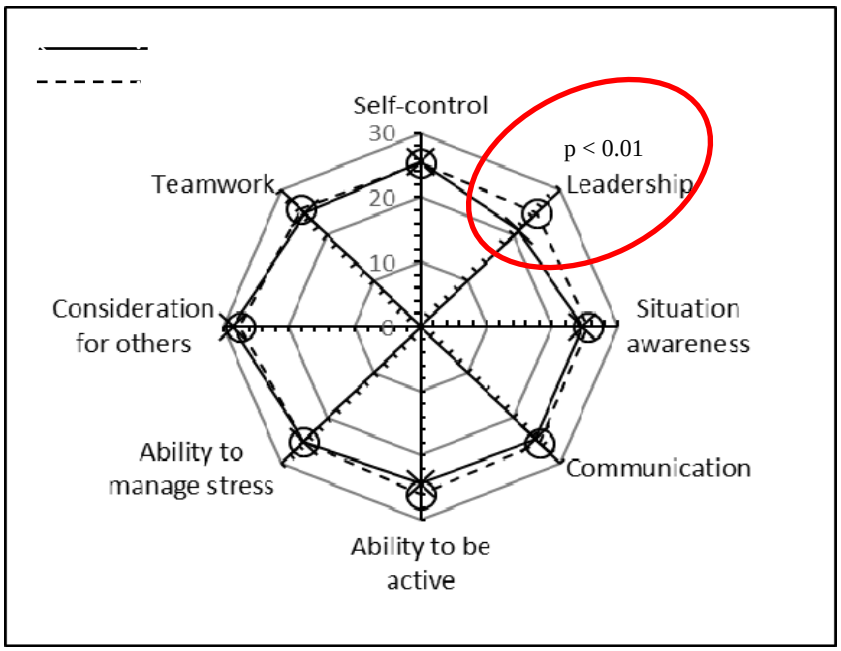

Figure 1 Comparing Competences Before and after Sailing Vessel Training

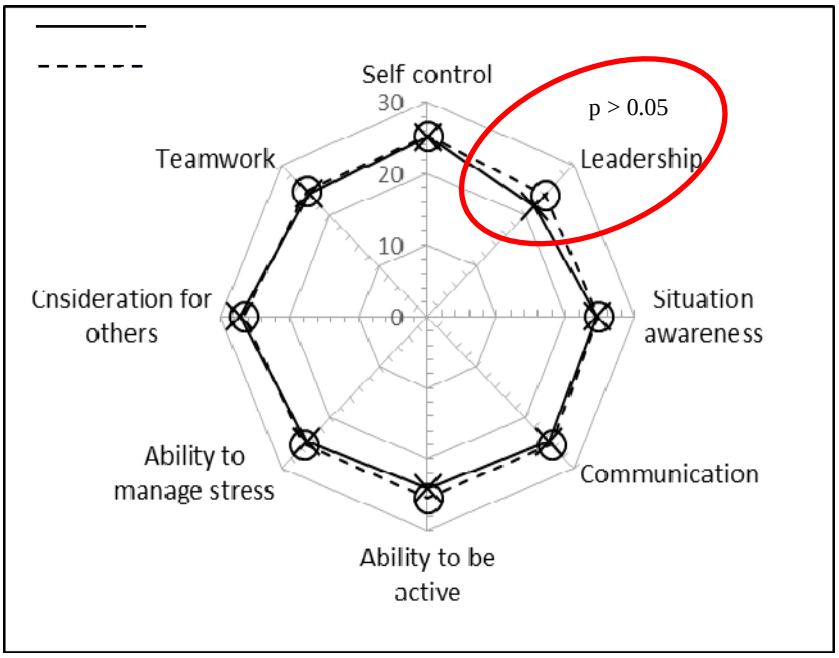

Figure 2 Comparing Competences Before and after Motor Ship Training

While a more detailed investigation is required, we suppose that the cause of the observed improvement in "leadership" after sailing vessel training is related to the necessity of assuming leadership roles during sail handling command and the necessity of cooperation and leadership when setting sails and making them fast. In the motor ship training, instruction was given on leadership and teamwork. However, the differences of scores on these items before and after the training were not significant, even though they improved. From the above result, it can be said that sailing vessel training and motor ship training have the effect of improving emotional performance. Moreover, the effect of sailing vessel training is larger than that of motor ship training, especially in regard to leadership.

Figure 3 and Figure 4 show changes in "ability to be active", "leadership", "consideration for others" and "teamwork". The horizontal axis shows time. In these graphs, sailing vessel training makes up the period from 0–2.3 months (2 months, 10 days). Then there is a break of about 0.7 months (20 days), followed by motor ship training from 3 to 5.3 months (another 2 months, 10 days). The vertical axis shows the average scores for various items assessed by the questionnaire (a maximum of 36 points). As shown in Figure 3, the fourth and final assessment shows higher scores than the first assessment in terms of "ability to be active" and "leadership". As shown in Figure 4, in contrast, the final assessment shows a decline from the first assessment in terms of "consideration for others" and "teamwork". These figures also show that the improvement of emotional competence after sailing vessel training is larger than that after motor ship training. Interestingly, it appears that "consideration for others", unlike any other item, improved somewhat during the break between voyages. Moreover, it is in "consideration for others" that a decline of performance is seen after sailing vessel training and motor ship training. The effect of sailing vessel training and motor ship training is shown to improve all competence items except "consideration for others". On the basis of our own experience, we surmise that these changes are the result of increased self-discipline and holding oneself to higher standards when assessing one's own "consideration for others".

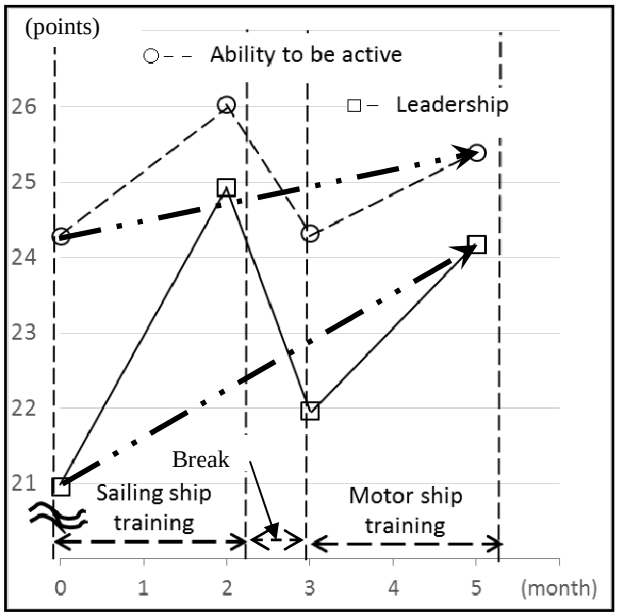

Figure 3 Change of "Ability to Be Active" and "Leadership"

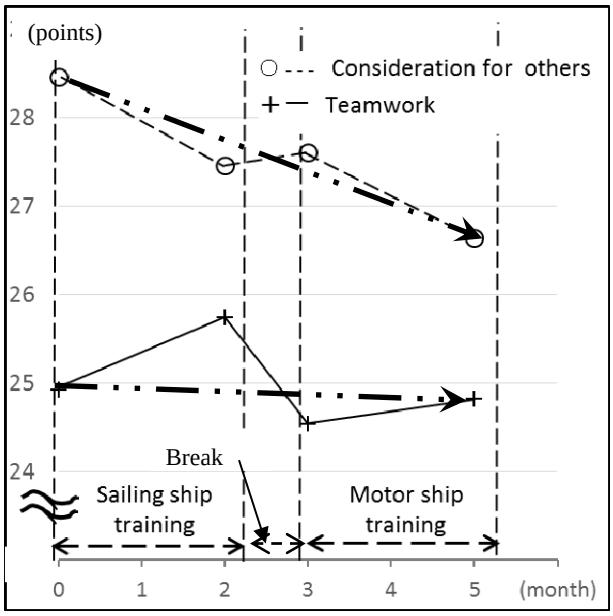

Figure 4 Change of "Consideration for Others" and "Teamwork"

3.2 Differences in Training Effects according to Group

In sailing vessel training and motor ship training, mandatory navigational duty and maintenance training are conducted in small groups. Changes in the competence of each group during sailing vessel training were investigated. The p value calculated using the t-test for each group is shown in Table 2, and the comparisons of item scores before and after sailing vessel training in Groups 2 and 4 are shown in Figure 5 and Figure 6, respectively.

There are clear differences among the groups. Compared with other groups, for example, Group 2 shows no significant improvement in any of the items; the cause for this is unknown. However, Group 2 included two

people who provided the same replies to all questions. Their presence may have influenced the atmosphere of the group; however, they were excluded from the analysis. Moreover, in the essays written at the end of training, approximately 30% of the trainees in Group 2 included negative comments such as “I was not able to climb the mast until the end of training, and I felt mortified”, “As my heart was often shaken privately, I was not able to be calm during the training”, and “I did not have any friends, and it was mentally painful”.

Table 2 The p Value according to the *t*-test for Each Group

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Self-control	p > 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05
Leadership	p < 0.05	p > 0.05	p < 0.01	p < 0.01	p < 0.01	p < 0.01
Situation awareness	p > 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05
Communication	p > 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05
Ability to be active	p < 0.05	p > 0.05	p > 0.05	p < 0.05	p > 0.05	p < 0.05
Ability to manage stress	p > 0.05	p > 0.05	p > 0.05	p < 0.05	p > 0.05	p > 0.05
Consideration for others	p < 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05	p > 0.05
Teamwork	p > 0.05	p > 0.05	p > 0.05	p < 0.05	p > 0.05	p > 0.05
Average	p < 0.05	p > 0.05	p > 0.05	p < 0.01	p > 0.05	p > 0.05

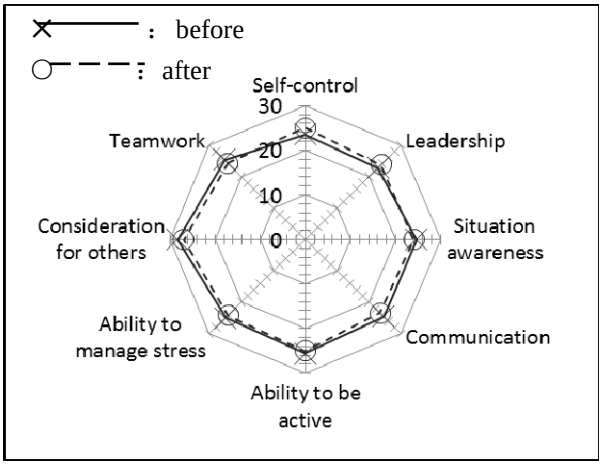

Figure 5 Comparing Competences before and after Sailing Vessel Training in Group 2

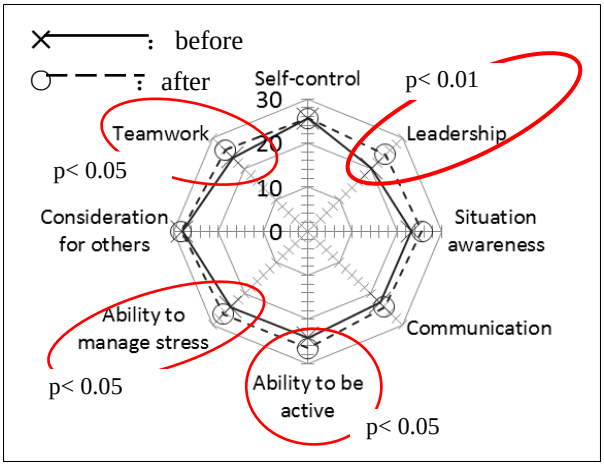

Figure 6 Comparing Competences before and after Sailing Vessel Training in Group 4

In contrast, the essays written by the trainees in Group 4 had many positive comments, such as “My relationships with my friends were deepened, and the leisure time was substantial”, “The experience in which I performed best was duty watch under canvas. I realized that the cooperation of the whole group was necessary for duty watch” or “Through sailing vessel training, I witnessed the crew pulling together to operate the ship”. Such comments were not only written by the members of Group 4, of course. We were unable to determine why the different groups seemed to respond differently, but we did note that the improvement in emotional competence items was remarkable in Group 4. We surmise that the members of Group 4 communicated well together and completed their training in a good atmosphere.

3.3 Comparison of University Students and Technical College Students

(1) Comparison after Sailing Vessel Training

Table 3 The p Value According to the t-test (Comparison of University and Technical College Students)

	University students	Technical College students
Self-control	$p > 0.05$	$p > 0.05$
Leadership	$p < 0.01$	$p > 0.05$
Situation awareness	$p > 0.05$	$p > 0.05$
Communication	$p > 0.05$	$p > 0.05$
Ability to be active	$p > 0.05$	$p < 0.01$
Ability to manage stress	$p > 0.05$	$p > 0.05$
Consideration for others	$p > 0.05$	$p > 0.05$
Teamwork	$p > 0.05$	$p > 0.05$
Average	$p > 0.05$	$p > 0.05$

The changes in self-reported results were compared between university students on the sailing vessel KaiwoMaru and technical college students on the sailing vessel Nippon Maru. On both KaiwoMaru and Nippon Maru, trainees completed self-assessments before and after their ocean-going voyages. The t-test results for the university students on KaiwoMaru are shown in Table 3, whereas the results for the technical college students on Nippon Maru are shown in Figure 7. Refer to Figure 1 for the results of the university students on KaiwoMaru. Although the technical college students’ results showed almost no change, a significant difference was recognized in their improvement in “ability to be active”. For the most part, the technical college students trained on Nippon Maru did not improve in emotional competence; any improvements that were seen were very slight. Further investigation is required to determine how much of this difference depends on students, how much on instructors, how much on environment, and how much on other factors.

The frequency distribution of improvement in competence in the university students and technical college students is shown in Figure 8. The horizontal axis of Figure 8 shows the difference in self-assessment score before and after the training. Positive numbers indicate higher scores after training than before. The vertical axis shows the proportion of students who changed to various degrees. Deep black indicates technical college students, and gray indicates university students. While the university students are distributed normally with one peak, the technical college students are distributed in two peaks. Thus, although the average degree of change is almost the same in university students and technical college students, the distribution of change differs. From this result, we surmise that university students’ intentionality toward the sea and the ship during training is generally higher on average. Among technical college students, conversely, intentionality is divided into two poles of people with high

intentionality and persons with low intentionality. However, since technical college students tended to improve notably in “ability to be active”, we surmise that the sailing vessel training was well received by them. Although the issue is not yet clear, we surmise that different levels of intentionality toward the sea and the ship were cultivated in the different schools before the sailing vessel training began. Further investigation into this matter is required.

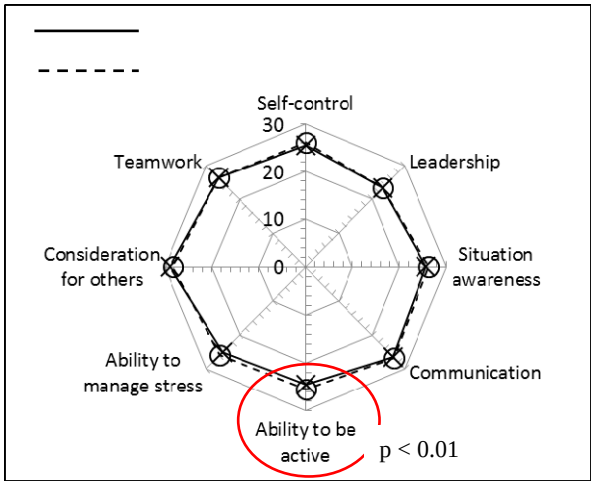

Figure 7 Comparing Competences before and after Sailing Vessel Training of Technical College Students

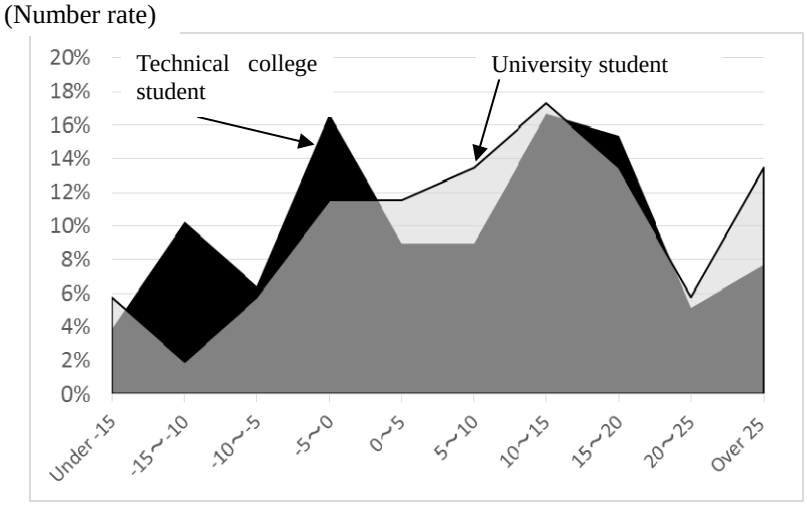

Figure 8 The Difference in the Frequency Distribution of University Students and Technical College Students

(2) Comparison after Motor Ship Training

The t-test results after the motor ship training of university students and technical college students are shown in Table 4. A comparison of competence scores before and after motor ship training for university students is shown in Figure 9, and that for technical college students is shown in Figure 10. For university students, who completed their motor ship training shortly after their sailing vessel training, no significant differences were found to result from motor ship training alone for any of the eight items. For the technical college students who completed their motor ship training with the university students, improvement was seen in seven items, i.e., all the items except “consideration for others”. The t-test revealed significant differences in four items, namely,

"leadership", "situation awareness", "ability to be active" and "ability to manage stress", at $p < 0.01$.

The following are proposed as possible causes of the differences between university students and technical college students.

(1) There was a difference in their ages: almost all the technical college students were 20 years old, whereas the university students were 22 years old or older.

Table 4 The p Values According to the T-test (Comparison of University and Technical College Students)

	University students	Technical college students
Self-control	$p > 0.05$	$p > 0.05$
Leadership	$p > 0.05$	$p < 0.01$
Situation awareness	$p > 0.05$	$p < 0.01$
Communication	$p > 0.05$	$p > 0.05$
Ability to be active	$p > 0.05$	$p < 0.01$
Ability to manage stress	$p > 0.05$	$p < 0.01$
Consideration for others	$p > 0.05$	$p > 0.05$
Teamwork	$p > 0.05$	$p > 0.05$
Average	$p > 0.05$	$p < 0.01$

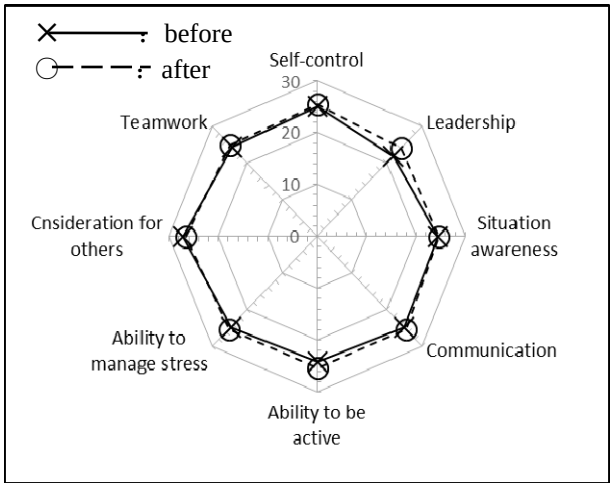

Figure 9 Comparing Competences before and after Motor Ship Training in University Students

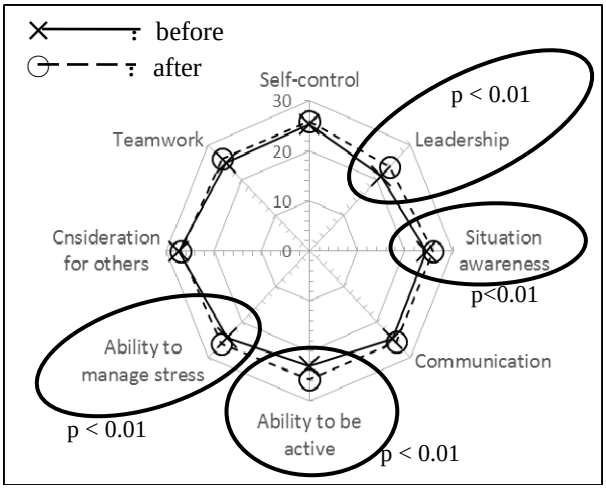

Figure 10 Comparing Competences before and after Motor Ship Training in Technical College Students

(2) The university students received their motor ship training shortly after completing their sailing vessel training. In contrast, the technical college students received their motor ship training following another motor ship training voyage. This may have influenced the differences in competence scores between the university and technical college students.

4. Questionnaire for Veteran Instructors

In order to investigate the causes of the self-reported results, we gave the questionnaire to training ship instructors who had 10 years or more of experience. We posed the following statement to eight persons who had experience as training ship instructors for 11 to 33 years:

The effect of sailing vessel training should be shown according to each of the following items:

(1) Sensitivity is raised.

(2) Curiosity is raised.

(3) An understanding of nature is deepened.

(4) Creativity is improved.

(5) A mindset of valuing things is cultivated.

(6) Self-motivation is raised.

(7) Cooperativeness and sociality are raised.

(8) Health and physical strength are maintained and increased.

(9) A capability corresponding to changes of nature is raised.

(10) An adventurous spirit is raised.

(11) Confidence is raised.

(12) A consciousness of environmental preservation is raised.

(13) Special knowledge and skills are studied.

All the instructors agreed on (3) and (7). Improvement in safety consciousness was indicated by free description.

The following was indicated about effective sailing vessel training:

(1) Sailing on duty under canvas

(2) Climbing the mast, and work of setting sails

(3) A life on the sailing vessel

(4) Heavy maintenance work, like a masts paint, etc.

Further, there is an effect of the routine activities that the trainees themselves perform actively.

5. Summary

A self-assessment questionnaire was administered before and after sailing vessel training and motor ship training and the following results were obtained.

(1) There was improvement after training in seven out of the eight emotional competence items, i.e., all except “consideration for others”. In particular, “leadership” improved remarkably after sailing vessel training.

(2) The same investigation was conducted before and after motor ship training, which followed sailing vessel training, and motor ship training was seen to have almost the same results. However, in this case, the improvement in “leadership” was not significant.

(3) The seven emotional competence items that were improved by sailing vessel training declined during the break of about 20 days following that training. They were improved again by the subsequent motor ship training, albeit to a lesser degree than by the sailing vessel training.

(4) Unlike other competences, self-reported “consideration for others” declined during both sailing vessel training and motor ship training. Moreover, unlike other competences, it showed slight improvement over the break.

(5) In sailing vessel training, individuals within groups that performed well together showed more improvement on emotional competence items.

(6) The change in emotional competence among university students and technical college students after sailing vessel training is almost the same in that all scores except that of “consideration for others” improved slightly. The only significant improvement was in “leadership” among university students. We investigated the frequency distribution of competence change and found that while change in university students was distributed in one peak near the overall average, the change in technical college students was distributed over two poles.

(7) Although the university students showed some improvement in competence scores after motor ship training, which was completed shortly after sailing vessel training, these differences were not significant. On the other hand, significant improvement in four of the eight items was seen after motor ship training for the technical college students.

6. Conclusion

As seen through a series of investigations, sailing vessel training had an effect in improvement in leadership. We thought that leadership is cultivated by sailing on duty and a life on the sailing vessel. The improvement in leadership was small after sailing vessel training, although it was also observed after motor ship training. This is considered to be based on the voyage and life of shipboard peculiar to a sailing vessel. By experiencing especially stormy weather, trainees may improve teamwork, patience, etc., more so than leadership. In the time period of the study, it consisted of sailing vessel training, a 20-day break, and motor ship training. The scores of seven items (all except “consideration for others”) improved after the sailing vessel training, declined after the break, and improved after the motor ship training. These changes show the effect of training.

It is interesting that all the items except “consideration for others” had lower scores after the 20-day break. We consider that the trainees for whom “consideration for others” appraise themselves severely after the first training. To determine whether “consideration for others” actually declined, further investigation is required.

In terms of emotional competence, the effect of training showed the possibility of differing by the following:

(1) differences arising from the group atmosphere;

(2) age of the trainees;

(3) differences in the trainees’ school;

(4) differences in the amount or contents of prior training.

We would like to investigate the factors affecting improvement in emotional competence associated with sailing vessel training in more depth in future studies.

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