Effects of Cutter Boat Experience on Adolescents' Abilities

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Abstract

The study reported in this paper investigated the effects of a cutter boat experience education program on adolescents' abilities. Data were collected by means of the IKIRU CHIKARA (IKR) (Zest for Living) inventory among 199 junior high school students at three points in time, namely before the cutter boat experience, directly after the cutter boat experience, and one month after the cutter boat experience. The IKR inventory targets three categories of ability, namely psychological and social abilities, moral abilities, and physical abilities, which are measured on the basis of 14 subscales, each comprising two items. The findings of this study showed: (1) The cutter experience improved the abilities of participants. However, depending on the subscale used, after one month, abilities had decreased a little. (2) The cutter experience program had a highly positive effect on the psychological and social, as well as moral abilities of the participants. (3) The subscales targeting positivity, adaptable behavior, range of vision-judgment, diligence, and compassion showed vast improvement among the participants. The results suggest that the cutter boat experience had a substantial influence on improving adolescents' overall abilities.

Keywords**:** *cutter boat experience, adolescents' abilities, IKR inventory, positive improvements, education*

1. INTRODUCTION

In order to contribute towards a healthy, emotionally enriched society, it is essential to nurture the youth mentally and physically, and to enhance their emotional education. As a guideline for education going forward, natural experience education is regarded as having the potential to elevate national educational standards. This paper discusses the effects of natural experience education on a cutter boat among adolescents. Previous researches have indicated that such experience has made a substantial contribution to achievements in experiential outdoor education[1), 2)]. Gray and Perusco conducted outdoor education aimed at specific psychological and social outcomes[3)]. The majority of such outcome studies have focused on camping educational programs, with outcomes examined by means of the IKIRU CHIKARA (IKR) inventory, reporting improvements in psychological and social, moral, and physical abilities[4), 5), 6), 7), 8), 9)]. Outdoor educational activities, on both land and sea, have been successfully used over the years for their positive benefits among adolescents. Among the range of nautical outdoor education activities, sail training has been shown to provide more effective experiences in terms of various aspects of individual development and personality[10), 11), 12)].

This study was inspired by Japan's status as a nation of shipping and fisheries, with widespread interest in ocean-based lifestyles. Furthermore, the maritime nature of the research provided access to various kinds of boats, giving us unique opportunities to consider the effects of cutter training in education. The cutter boat is a standard type of boat that has traditionally been used as a lifeboat or contact boat, and is generally mounted on larger vessels. These boats generally use oars, but some are equipped with masts and sails. In addition, when rowing, unlike boats that can be operated by individuals, multiple members work together and cooperate to reach common goals and objectives in a cutter. Because of this, training with cutter boats improves the acquisition of teamwork and technical skills, and through the process of learning, also reduces maritime tensions and ensures safety.

Cutter training and sail training, two similar types of outdoor education, may have the same powerful educational effects on adolescents' abilities. Until now, there has been a paucity of outcome studies focusing on cutter training for adolescents, and research on educational programs other than sail training are also lacking in variety and quality. We suggest that cutter boat training has the potential to provide effective personal growth experiences for adolescents. Note too that cutter boat training has in recent years become recognized as an effective educational activity in Japan. People of all ages across the country, including those in elementary school, actively practice on cutter boats. Although cutter training has become an educational activity in Japan, it remains unclear what this has

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achieved. For the purposes of this study, we propose the hypothesis that cutter experience can improve adolescents' abilities.

In order to examine the effects of cutter experience on adolescents' abilities in this study, we used the IKR inventory. This self-report questionnaire was completed by participants before, immediately after, and one month after their cutter experience. This allowed us to determine the relationship between the cutter experience and the participants' abilities, and to determine any change over time.

2. METHOD

2.1 Participants

A total of 199 Grade 1 junior high school students (121 males and 78 females) in Hiroshima participated in the cutter experience program that was the focus of this study. On average, participants 12.5 years old, have a golden period of time to foster adolescents' abilities. All the participants had never experienced cutter boat before. The junior high school concerned was interested in finding ways to improve education aimed at developing individuality and competence through outdoor activities, and identified students who might require additional or specific life skill instruction. The cutter experience program was conducted at Tsuneishi Shimanami Village.

2.2 The IKR inventory

The IKR inventory, developed by Tachibana et al.[13], is a self-report questionnaire designed to determine the constituent characteristics of IKIRU CHIKARA (Zest for living) in the outdoor educational program. It is aimed at detecting an increase in the desire for learning among adolescents that is required for self-realization, as well as for meeting the demands of appropriate adaptation to social change. The IKR inventory consists of three ability scales, namely those targeting psychological and social abilities, moral abilities, and physical abilities. These types of ability are measured by means of 14 subscales, and each subscale comprises two items. In this study, cutter skills are also one of the physical abilities. In order to measure the cutter skills developed by cutter experience, we created a new subscale (with two items) for the questionnaire. We collected concrete question items to describe "cutter skills", and then verified whether adolescents understood the question items or not in quantitative and qualitative analysis. As a result, the two items have been selected. The questionnaire has well

Table 1 Items in the IKR inventory

Abilities measured	Subscales	Question items
Psychological and social abilities	Independence	You can clearly refuse anything you hate. You are not afraid of making small mistakes.
	Positivity	You can move forward and do your best in anything. You can actively consider everything.
	Cheerfulness	You can talk to everyone. You can get over the shock of failure quickly.
	Friendship-cooperation	You are loved by many people. You can get along with everyone.
	Actual affirmation	You love yourself very much. You can greet everyone.
	Range of vision-judgment	You can foresee events and make a plan by yourself. You can detect problems and issues by yourself.
	Adaptable behavior	You can listen to people carefully. You can adapt to the occasion.
Moral abilities	Self-regulation	You are not selfish. You don't waste money and things.
	Concern with nature	You are impressed by beautiful scenery such as the sea. You can feel the changing of the seasons.
	Diligence	You like to work very hard. You can do an assigned job well.
	Compassion	You like doing things for people. You can understand other people's pain.
Physical abilities	Active behavior	You can go to bed and wake up early. You don't get tired from physical activity.
	Physical tolerance	You don't suffer from heat and cold. You can endure a serious injury.
	Outdoor life-skills	You can use cutter tools, such as a knife, well. You can wash clothing by hand without a washing machine.
	Cutter skills	You want to row a cutter boat. You have confidence in using the oar well.

enough reliability and validity. Thus, the IKR used here comprised 15 subscales. Seven subscales of the IKR measure psychological and social abilities: independence, positivity, cheerfulness, friendship- cooperation, actual affirmation, range of vision-judgment, and adaptable behavior. Moral abilities are measured by four subscales: self-regulation, concern with nature, diligence, and compassion. Finally, four subscales measure physical abilities: active behavior, physical tolerance, outdoor life-skills, and cutter skills (the latter having been added for purposes of the present study).

Participants were required to respond to each item on a Likert-type scale in which 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Neither Agree nor Disagree," 4 = "Agree," and 5 = "Strongly Agree." Each subscale was scored by taking the mean of the item responses. The questionnaire items are shown in Table 1.

2.3 Procedure

Each participant completed the IKR inventory immediately before (pre-test), directly after (post-test 1), and one month after the cutter experience (post-test 2). The three testing times were carried out by using the same questionnaire. During the cutter experience, all the participants divided into groups to row cutter boats. The coach taught them how to use the oar well, how to cooperate with each other, and so on. The pre-test was designed to measure participants "zest for living" and to establish a base line before the cutter experience. Post-test 1 aimed to determine the effects of engagement with the cutter training, i.e., the results of the cutter experience program. The final survey, post-test 2 aimed to verify whether any positive effects continued one month after the cutter experience. We extrapolated from the distributions found in the pre-test and post-test 1 (i.e., determining the short term effect of the cutter experience), and also from those in the pre-test and post-test 2 (i.e., determining persistent effects of the cutter experience). To encourage the adolescent participants to answer truthfully, we emphasized that their responses would be confidential, and would be analyzed collectively rather than individually. Participants were also told that there were no right or wrong answers to any of the items, and that honest responses were of great importance.

Table 2 The timing of the IKR inventory tests

Pre-test date	Aug 20, 2014
Post 1-test date	Aug 21, 2014
Post 2-test date	Sep 26, 2014

2.4 Statistical analysis

Questionnaires with missing or incomplete data were excluded from analysis, and data were entered and analyzed using the Statistical Package for Social Sciences (SPSS, 2007) software. A one-way analysis of variance (ANOVA) and Tukey HSD post-hoc analysis for multiple comparison were conducted in order to summarize and interpret the descriptive data. Initially, descriptive analyses (Mean [M], Standard Error [SE], p-value [p]) were conducted to explore differences among the IKR subscales and to compare the results among the pre-test and post-tests. Statistical significance was set at $p < .05, p < .01$.

3. RESULTS

The survey in this study gathered information on participants' psychological and social abilities, moral abilities, and physical abilities at three points in time, namely before the cutter experience, immediately after the cutter experience, and one month after the cutter experience. The results are discussed below.

3.1 Psychological and social abilities across testing times

The data in Fig.1 show a significant increase ($p < .05$) on the positivity subscale and strong increases ($p < .01$) on the range of vision-judgment and adaptable behavior subscales between the pre-test and post-test 1, i.e., before and immediately after the cutter experience. Moreover, by analyzing the persistence of the effects, we identified that these three subscales also showed significant changes between the pre-test and post-test 2, i.e., from before the experience to one month after the experience. It is important to note that the only strong significant increase ($p < .01$) between post-tests 1 and 2 was for the range of vision-judgment subscale.

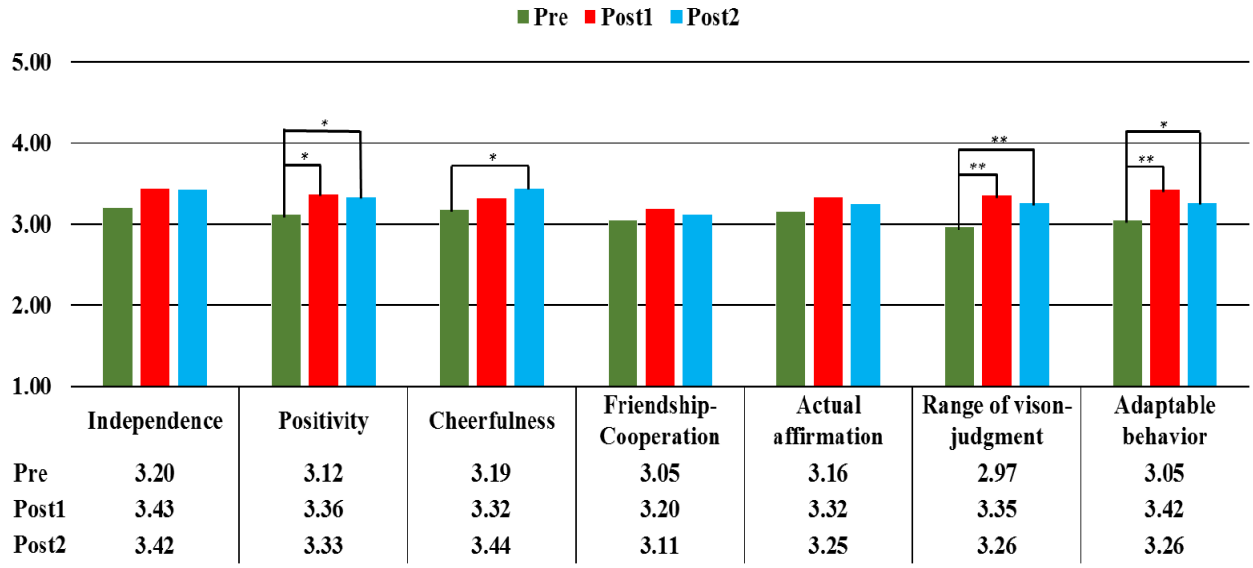
Variations in participants' scores across time were also evident for the independence, friendship-cooperation, and actual affirmation subscales. There were no significant differences across testing times, but the mean scores for these three subscales show an ascending trend between the pre-test and post-test 1, suggesting that the cutter experience did positively affect the psychological and social abilities of the participants.

In terms of the cheerfulness subscale ($p = .472$), there was no significant difference between participants' scores for the pre-test and post-test 1. However, cheerfulness did increase slightly significantly between pre-test and post-test 2 ($p < .05$).

These findings suggest that the immediate effect of the cutter experience on the participants' psychological and social abilities were reflected by improvements in terms of positivity, range of vision-judgment, and adaptable behavior, which persisted even after one month following the experience.

3.2 Moral abilities across testing times

Fig.2 presents the results for the moral abilities subscales. Significant positive changes were found for self-regulation, concern with nature, diligence, and compassion between the pre-test and post-test 1. Specifically, self-regulation and diligence showed greater increases ($p < .01$) than did concern

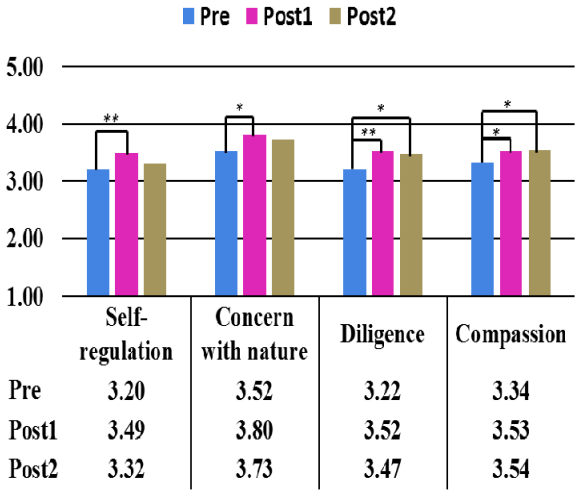


	Independence	Positivity	Cheerfulness	Friendship-Cooperation	Actual affirmation	Range of vison-judgment	Adaptable behavior
Pre	3.20	3.12	3.19	3.05	3.16	2.97	3.05
Post1	3.43	3.36	3.32	3.20	3.32	3.35	3.42
Post2	3.42	3.33	3.44	3.11	3.25	3.26	3.26

Fig.1 Mean scores for psychological and social abilities in the pre-test and post-tests 1 and 2 (* $p < .05$, ** $p < .01$)

with nature and compassion ($p < .05$). Whereas an ascending trend was evident for the four moral ability subscales between the pre-test and post-test 2, the increase in the mean scores for self-regulation and concern with nature was not significant. The diligence and compassion subscales showed continued significant changes ($p < .05$), including at one month after the experience. The mean scores for most subscales were lower at post-test 2 than at post-test 1, but the mean score for compassion was higher at post-test 2 (M = 3.54) than at post-test 1 (M = 3.53). Thus, compassion increased the most between the pre-test and post-tests.

The above results show that the cutter experience affected participants' moral abilities in terms of self-regulation, concern with nature, diligence, and compassion, but the effects on self-regulation and concern with nature decreased after one month, whereas the remaining two subscales retained the positive effects of the cutter experience.



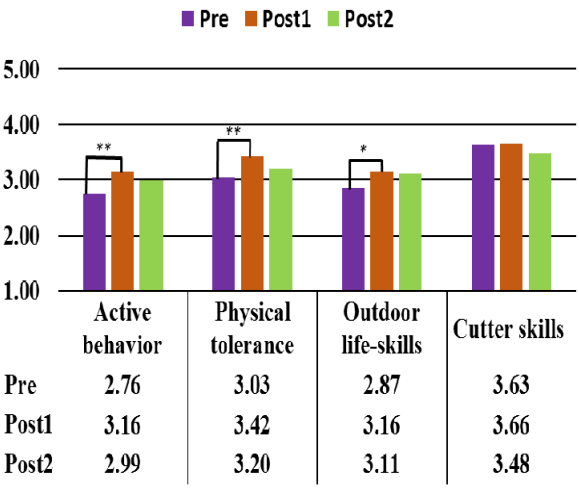
	Self-regulation	Concern with nature	Diligence	Compassion
Pre	3.20	3.52	3.22	3.34
Post1	3.49	3.80	3.52	3.53
Post2	3.32	3.73	3.47	3.54

Fig.2 Mean scores for moral abilities in the pre-test and post-tests 1 and 2 (* $p < .05$, ** $p < .01$)

3.3 Physical abilities across testing times

The data in Fig.3 show that the only significant differences in physical abilities between the pre-test and post-test 1 were for the active behavior, physical tolerance, and outdoor life-skills subscales. The changes in scores for the active behavior and physical tolerance subscales ($p < .01$) were stronger. Analysis of the scores in pre-test and post-test 2 showed no significant differences for these three subscales. For the cutter skills subscale, there were no significant differences, either between the pre-test and post-test 1 or between the pre-test and post-test 2.

Thus, the effects of the cutter experience on the participants' physical abilities were positive in terms of active behavior, physical tolerance, and outdoor life-skills between pre-test and post-test 1, whereas the effect decreased between pre-test and post-test 2.



	Active behavior	Physical tolerance	Outdoor life-skills	Cutter skills
Pre	2.76	3.03	2.87	3.63
Post1	3.16	3.42	3.16	3.66
Post2	2.99	3.20	3.11	3.48

Fig.3 Mean scores for physical abilities in the pre-test and post-tests 1 and 2 (* $p < .05$, ** $p < .01$)

4. DISCUSSION

4.1 The short term effects of the cutter experience

All of the 15 subscales showed an increase from before to just after the cutter experience, and these results are summarized in Table 3. Ten of the IKR inventory subscales, namely positivity, range of vision-judgment, adaptable behavior, self-regulation, concern with nature, diligence, compassion, active behavior, physical tolerance, and outdoor life-skills, showed significant increases between the pre-test and post-test 1. In addition, highly significant increases ($p < .01$) were found for certain psychological and social abilities subscales (range of vision-judgment and adaptable behavior), certain moral abilities subscales (self-regulation and diligence), and the physical abilities subscales (active behavior and physical tolerance). Therefore, the cutter boat experience improved the psychological-social, moral, and physical abilities of the participants.

Even a brief cutter experience could have a marked positive short term effect on adolescents. When the present participants undertook the cutter experience, they immediately realized that it was a group activity, and this led them to adapt their behavior for training on the cutter boat with the other participants. Often, the participants had followed extracurricular activities, such as painting, web work and so on, other than cutter training which was transferrable to the outdoor environment. With this change in educational activity, the participants' range of vision and judgment improved. Moreover, in order to achieve goals on the cutter boat, they not only had to cooperate with others, but also develop an inner desire for progress. Such characteristics of the training caused the participants to learn self-regulation and diligence in their maturation and growth. Because it was not easy to row the cutter boat, the participants needed to build up their physical strength, active behaviors, and physical tolerance, which all improved through the cutter experience. The cutter skills themselves were not shown to improve significantly in this study, as the mean scores tended to remain consistent. As the study covered only one cutter experience with limited training time, further research is needed in this regard. It is also noteworthy that the friendship-cooperation subscale did not reflect significant improvement. However, participants were observed to strengthen their unity, friendship, and cooperation with their peers during the cutter experience. This may be due to their lack of previous cutter experience. However after the cutter experience, an ascending trend was noted in scores, and so it is assumed that the experience did have a slight effect on friendship-cooperation abilities.

In sum, the findings reveal that the participants improved in terms of their psychological and social, moral, and physical abilities through the short term cutter experience in this study.

4.2 The persistent effects of the cutter experience

For of IKR subscales in this study, a descending trend occurred between post-tests 1 and 2, immediately following and one month after the cutter experience. However, an ascending trend occurred between the pre-test and post-test 2, i.e., from before to one month after the cutter experience. In the comparison of scores, the psychological and social abilities of positivity, cheerfulness, range of vision-judgment, and adaptable behavior, as well as the moral abilities of diligence and compassion, showed significant differences between the pre-test and post-test 2. With respect to these six subscales, with the exception of cheerfulness, also showed a significant difference between the pre-test and post-test 1. Furthermore, physical abilities improved significantly from before to immediately after the experience, but there were no significant increases remaining one month later. Thus, psychological and social, and moral abilities showed continued positive effects even one month after the cutter experience, particularly in terms of the subscales for positivity, range of vision-judgment, adaptable behavior, diligence, and compassion, all improving significantly among the adolescents in this study.

The contextual analysis of the IKR inventory reveals that the significance of the effects of the cutter experience was temporary, and had faded away by one month after the cutter experience. Once the participants had gone back to their daily lives and reverted to their previous educational circumstances, following the cutter experience, they had limited contact with nature. Moreover, the lack of cutter experience following the program may also partially explain the observed decrease in self-regulation and concern with nature. The participants achieved remarkable success in active behaviors, physical tolerance, and outdoor life-skills during the cutter experience, but after one month, it was to be expected that these effects did not persist. The developmental power of the positivity and compassion experienced through the cutter boat experience, a group activity program, presented more positive effects for development, even after one month. In terms of cheerfulness, we assume that the participants perceived some other social requirements in their daily lives one month after the cutter experience. The effect of the cutter experience appears to have had repercussions for cheerfulness.

Addressing the descending trends found in this study, a clear decrease in physical abilities was noted one month after the cutter experience. However, post-test 1 showed an ascending change from pre-test, and the same slight ascending change was also found between pre-test and post-test 2. There was also a trend towards improvement in the participants' zest for living. A good cutter experience could thus have persistent positive effects on adolescents, extending beyond the short term.

4.3 The suitability of a cutter experience for adolescents

In the cutter experience program, each participant created a strong relationship with other peers, and compassion, positivity, and diligence grew rapidly. Psychological and social abilities,

Table 3 Mean, SE, and *p*-values from ANOVA and Tukey HSD post-hoc analysis

Abilities measured	Subscales	Pre-test – Post-test 1			Pre-test – Post-test 2		
		M_1	SE_1	*p*	M_2	SE_2	*p*
Psychological and social abilities	Independence	-0.223	0.097	0.058	-0.219	0.093	0.050
	Positivity	-0.246	0.092	*	-0.209	0.088	*
	Cheerfulness	-0.127	0.109	0.472	-0.252	0.104	*
	Friendship-cooperation	-0.143	0.085	0.215	-0.062	0.082	0.730
	Actual affirmation	-0.165	0.087	0.140	-0.094	0.083	0.501
	Range of vision-judgment	-0.382	0.087	**	-0.299	0.083	**
	Adaptable behavior	-0.375	0.085	**	-0.215	0.082	*
Moral abilities	Self-regulation	-0.283	0.092	**	-0.113	0.089	0.409
	Concern with nature	-0.282	0.097	*	-0.214	0.093	0.057
	Diligence	-0.301	0.090	**	-0.253	0.086	*
	Compassion	-0.190	0.080	*	-0.200	0.077	*
Physical abilities	Active behavior	-0.399	0.107	**	-0.229	0.103	0.066
	Physical tolerance	-0.388	0.104	**	-0.170	0.100	0.206
	Outdoor life-skills	-0.287	0.113	*	-0.246	0.108	0.060
	Cutter skills	-0.021	0.102	0.977	0.157	0.098	0.243

* $p < .05$, ** $p < .01$ M_1 = M (pre-test) – M (post-test 1) M_2 = M (pre-test) – M (post-test 2)

as well as moral abilities, featured in this cutter experience project. The individual participants' perceived ability to perform various activities in this nautical environment was evident. On the cutter boat, each participant was experientially engaged in several moral activities, which provided opportunities to independently explore new roles and possibilities for functioning, while being actively in control of their own actions and outcomes. The confined environment allowed participants to receive immediate and often positive regard from others. The above-mentioned aspects presented themselves repeatedly in the environment of the cutter boat, significantly improving psychological and social, as well as moral abilities. However, the need for physical abilities disappeared once the participants were back home.

The cutter boat experience, a group outdoor education project, required all participants to work together and help each other. The collective action of the participants, and their exchanges with peers, are special characteristics that promote community networks between schools, families, and social groups. Moreover the cutter boat experience deepened participants' interest in the nature of the sea. The educational effects of the cutter boat experience appear to have met their purposes, and had a nurturing effect on the participants.

5. CONCLUSION

In this study, our original hypothesis was that cutter experience can improve adolescents' abilities. We conducted a "Zest for Living" questionnaire survey among 199 Hiroshima junior high school first grade students at three points in time. The following results were obtained:

1. The three types of abilities reflected by the IKR showed significant change. Therefore, the cutter experience may be regarded as having improved the abilities of adolescents. However, for certain subscales, abilities decreased a little after one month.
2. The cutter experience led to improvements in the psychological and social, moral, and physical abilities of the participants. In particular, the psychological-social, and moral abilities showed persistent positive effects even one month after the cutter experience.
3. The subscales for positivity, adaptable behavior, range of vision-judgment, diligence, and compassion all reflected vast improvements among the participants in this study.

Japan is a maritime nation that benefits from the sea that surrounds it on all sides. "To learn the sea" and "to learn in the sea" are paradigms that differ from everyday life in some countries. Adolescents in Japan are provided opportunities for contact with the marine environment in order to enhance their abilities to adapt and to cooperate with one another, and so on. Cutter boat experience programs are activity-based with natural experiences for adolescents. At the outset of this study, we proposed that the cutter experience would raise the ability levels of the participants. We suggest that cutter experience, as an educational practice, would be adaptable to school aims

regarding nature and could function as one of the leading models for natural experience education. Moreover, cutter boat is a kind of marine sports, the basic education program of seamanship. Not only are regular experiences in nature, but also cultivate adolescents' lifelong interest and deepen adolescents' sense of maritime.

In recent years, many seaside schools have in actual fact reduced the importance of natural experiences for students. We propose that students be made to jump out of the classroom, escape from normal classes, and be presented with opportunities to increase their ability to use knowledge for practical purposes through mutual cooperation among schools, families, and communities.

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