



The Effect of Hybrid Training Combined with on Demand Classes

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ABSTRACT

One aspect of life hit hard by the COVID-19 pandemic in 2020 was education in general and, in this case, actual ship training. The same is true for anchoring training, implemented annually as part of maritime training. Therefore, to conduct ship training effectively and briefly, this study advocates hybrid training, that is, shortened practical training combined with on demand video learning materials created and distributed to students in advance. Group work on ship handling planning that lasts for three to six hours is normally conducted annually in traditional classes. However, because of the pandemic, the allotted time for group work was reduced to approximately 1.5 hours. Therefore, in 2020, we conducted hybrid training, that is, anchoring training that included on demand video learning materials. Compared to students' 66.3% average achievement rate in 2018 and 2019, the average in 2020 was 78.3%. 'Anchoring procedure' and 'altering course' items showed a particularly large gap in evaluation. The following were effects of hybrid training: (1) Videos that can be watched in advance can also be viewed repeatedly at one's own pace. (2) The capacity to watch videos via smart phones provides students with better access. (3) As videos can be watched in advance, students become familiar with concepts before training, thus leading to better understanding of the training's content and purpose. These results demonstrated hybrid training's effect when practical training is combined with on demand materials.

Keywords: Hybrid training, On demand class, Actual ship training, Group work.

INTRODUCTION

In January 2020, mass media frequently began to cover the outbreak of COVID-19. Then, on March 11, the World Health Organization (WHO) announced that the outbreak had reached the pandemic level. Our movements were greatly restricted all over the globe and as the pandemic impacted daily life with cancellation after cancellation, we were forced to respond to a global crisis that our modern society had never experienced before.

In school education, graduation ceremonies were reduced or cancelled, and we struggled to prepare for the new fiscal year. Beginning in April 2020, online classes became the mainstream, and education had to suddenly adapt, for instance, by implementing new teaching methods, creating new and appropriate materials, improving the online learning environment, developing alternative methods for practical training and supporting students' mental health and financial situations. New issues rushed in one after another, while educators struggled to respond to ever-changing circumstances.

Specifically, due to COVID-19, in 2020, actual ship training usually conducted in October for two nights and three days became three separate day trips. Normally, on the first day, group work was conducted for three to six hours to create an anchoring plan. In 2020, however, it could be conducted only for about 1.5 hours because training involving overnight stays was not possible. Because many studies have clarified the effect of group work on education and training [1][2][3][4] and many researchers have demonstrated effects of training models that incorporate group work,[5][6] anchoring training had to be adjusted to enable efficient and effective group training within a short time. This was achieved by distributing video learning materials, such that students could learn content before they took the actual ship training. An evaluation survey's results clarified the positive effect of hybrid training, that is, preliminary on demand materials combined with practical training.

PURPOSE

In various studies, the authors have verified the positive effects of developing and implementing on board training. So far, we have shown the positive effects of self-evaluation and mutual evaluation [7] and of a rubric-style evaluation list.[8] In addition, analysis of trainees' impressions has helped improve training models qualitatively.[9] Now, we investigate the effect of hybrid training that combines advance distribution of video (on demand) learning materials and practical anchoring training.

INVESTIGATION METHOD

Anchoring training

Anchoring training, performed by student teams without instructor assistance, is a suitable exercise for improving ship handling skills through various manoeuvres. First, students heave up the anchor and sail a planned route and then, after passing planned waypoints, they anchor at a planned anchorage. Anchor training is suitable not only for learning manoeuvring procedure based on actual performance but also for learning various elemental techniques for manoeuvring, for information exchange and management skills and for improving ability related to those skills.[10]

Anchoring training is generally performed by a team of four-persons, each with defined roles: captain (role of captain-ROC), first officer (role of 1st officer-RO10), third officer (role of 3rd

officer–R030) and quartermaster (role of quartermaster–ROQ). Thus, anchoring training is considered effective group work, with a flow as follows:

(1) Taking the lead, the ROC develops a navigation plan for anchoring. This active student planning of ship handling is designed to develop the ROC's leadership skills and create opportunities for peer learning. The ROC explains the navigation plan to teammates and instructors, who then give advice and feedback to correct the plan. After making corrections to the navigation plan, the ROC briefs team members and instructors, who then check their notes and roles.

(2) Conduct actual ship training:

a) The ROC positions the leaving anchorage station and, before heaving anchor chains, directs the R030 to prepare the main engine and then directs the heaving up of the anchor.

b) When the anchor is aweigh, the ROC sets off on a predetermined course using the main engine and rudder.

c) The ROC appropriately corrects the course to ensure that the planned route can be navigated. The ship then passes two scheduled waypoints and navigates the predetermined route.

d) The ROC slows the main engine, adjusts the course and stops the ship by applying the main engine to the sternway to ensure it is positioned correctly at the planned anchorage.

e) The ROC lets the anchor go at the planned anchorage, lets out the cables to a predetermined length, stops the main engine and finally dismisses the anchoring station.

Figure 1 shows the planned route and an example of track in the training area.

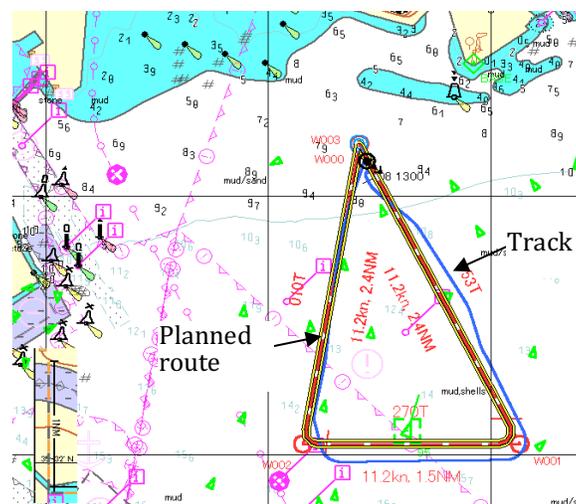


Figure 1 The planned route and an example of track in the training area

(3) Shortly after the training ends, students self-evaluate based on a rubric.

(4) Each team then discusses the anchoring training, that is, its positive aspects and those needing improvement. Each team member presents his/her ship handling notes, while the others engage in active listening and thinking. Instructors comment based on the evaluation rubric.

(5) Students consider and suggest improvements to the self-evaluation rubric.

Instructors' evaluation and comments

In anchoring training, two instructors who are experienced captains of a large training ship conduct training evaluation; the same two instructors performed consecutive evaluations in 2018, 2019 and 2020.

In 2020, the previous training schedule was shifted to three day trips due to COVID-19. For the training in 2018 and 2019, the contents of the two on demand learning videos were explained verbally during boarding but in 2020, because group work time was short, we instructed the students to watch the on demand learning materials (listed below) in advance.

- (1) Explanation video of 'Shiojimaruru [name of training ship] anchoring training implementation procedure and anchoring training implementation plan' (about 1 hour)
- (2) Explanation video of 'The points of anchoring training' (about 45 minutes)

Students in 2018 and 2019 did not watch the on demand videos in advance because they had enough time for group work. To check for differences in student performance, we compared 2018 and 2019 evaluation results with those of 2020. For evaluation of anchoring training, 14 specific evaluation items were determined and the rubric evaluation, which sets evaluation criteria for each item, was adopted. Evaluation criteria were scored in four stages: 4 points (90 or more out of 100 points), 3 points (80–90 points), 2 points (60–80 points) and 1 point (fewer than 60 points). Then, average scores for each year of scored evaluations were compared.

Additionally, in 2020, the two instructors commented on the students' evaluations.

Students' evaluation and impression of on demand learning materials

In 2020, students evaluated the hybrid training according to three ratings: 1) No effect; 2) Neither; 3) Effective. Students' impressions were analysed with an affinity diagram, a qualitative method.

RESULTS

Comparison of evaluations by instructors

Figure 2 shows that on all evaluation items, scores in 2020 were higher than averages in 2018 and 2019. In 2020, the average of all evaluation items was 3.13 and the achievement rate was 78.3%. On the other hand, in 2018 and 2019, the average was 2.65 and the achievement rate was 66.3%. In the evaluation, the items 'anchoring procedure' and 'altering course' showed large differences.

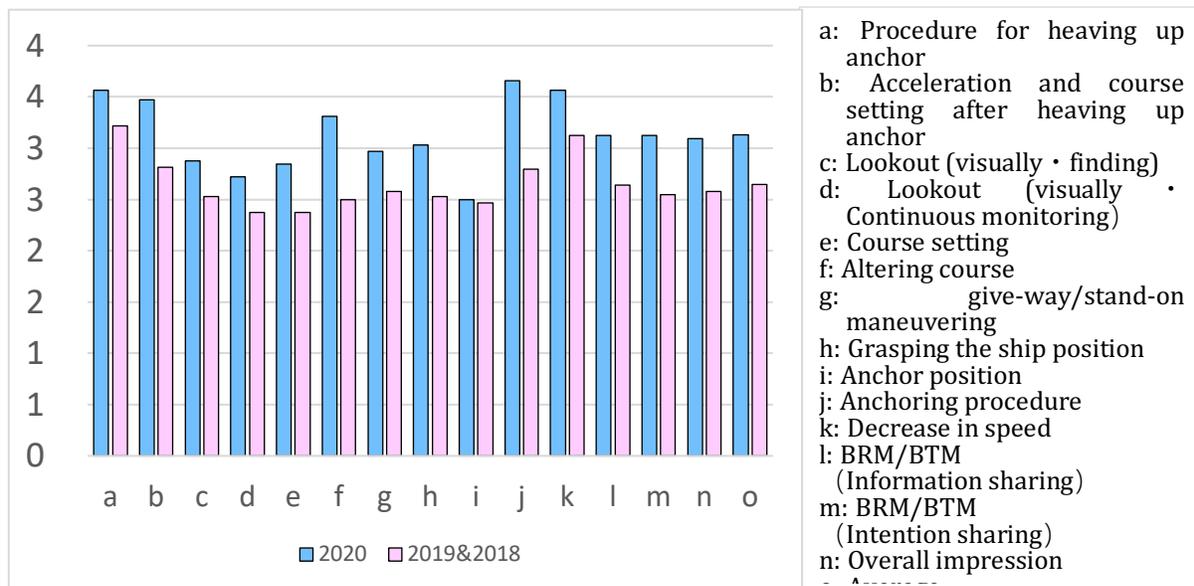


Figure 2. Comparison of evaluation scores based on the presence or absence of hybrid training that combines on-demand class

An unpaired two-sample t-test was performed on both and $p < 0.01$ indicated significant difference between the two. Table 1 shows t-test results for each evaluation item.

As Table 1 shows, nine of fourteen evaluation items had p-values lower than the predominant 0.01 and three items had lower than 0.05. Only two items, ‘continuous monitoring of lookout’ and ‘anchor position’ showed no significant difference.

Table 1 Results of t-test for each evaluation

	Evaluation items	t-test
1	Procedure for heaving up anchor	*
2	Acceleration and course setting after heaving up anchor	**
3	Lookout (visually • finding)	*
4	Lookout (visually • Continuous monitoring)	n.s.
5	Course setting	**
6	Altering course	**
7	Give-way/stand-on manoeuvring	*
8	Grasping the ship’s position	**
9	Anchor position	n.s.
10	Anchoring procedure	**
11	Decrease in speed	**
12	BRM/BTM (Information sharing)	**
13	BRM/BTM (Intention sharing)	**
14	Overall impression	**
15	Average	**

n.s.: non-significant, *: $p < 0.05$, **: $p < 0.01$

Instructor's comments

The two instructors, who taught and evaluated the anchoring training, commented as follows:

- On day voyages, the students did not have enough time for the group work previously assigned; nevertheless, on demand materials provided efficient, if brief, group work.
- Students who watched the on demand videos asked questions in advance, demonstrating their high motivation.
- As a whole, the students seemed to understand well. The on demand videos seemed to make up for the lack of group work and role-playing normally conducted at night.
- Students were expected to watch the on demand learning materials once but many watched them multiple times; this seems to have improved training results.
- Watching students lie down to watch on demand videos on their smartphones, I felt that a new learning method was being established.
- Both instructors acknowledged the on demand materials' effectiveness.

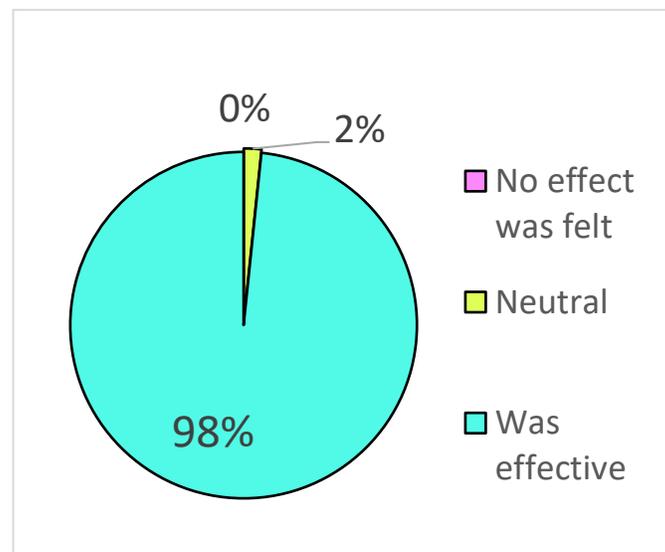


Fig. 3 Student evaluation of hybrid training

Evaluation by students

Figure 3 shows the students' evaluation of hybrid training. As the figure illustrates, 98% of the students rated it effective.

Figure 4 shows analysis results of student impressions using the affinity diagram, a qualitative method. Students reported a slight impression that one on demand video was too long. On the other hand, the overwhelming majority felt that the on demand approach and materials were effective as content, as a viewing method and as an utilisation method.

From the affinity diagram, students' impressions of hybrid training were documented as follows.

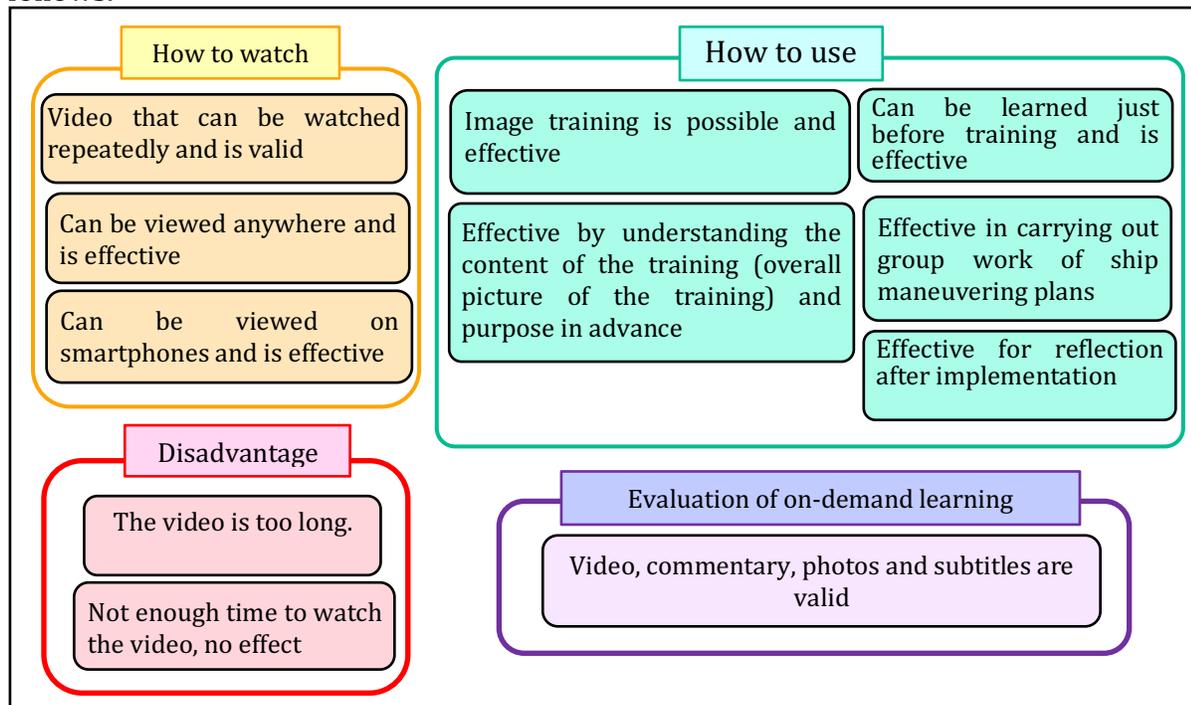


Figure 4 Affinity diagram of student impressions on hybrid training

- (1) On demand learning materials can be viewed anytime, anywhere and as many times as students like. In addition to students' advance understanding of the training's purpose, content and flow, the materials served as image training; this was advantageous because hybrid training that utilises image training is very effective.
- (2) The on demand learning materials were effective for understanding the training's purpose and content in advance, for conducting group work and for checking immediately prior to and reflecting on after the practical ship training.
- (3) On demand learning materials gain effectiveness by utilising videos, explanations, photographs and subtitles. On the other hand, carefully determining on demand materials' length is advisable.

Considerations

We conducted hybrid training that included on demand materials and practical training. Afterward, we confirmed the following from differences in evaluations and comments from instructors, student evaluations and analysis of student impressions.

- (1) Compared with the two previous years, when on demand materials were not available, evaluation by instructors confirmed that the training effect improved after incorporating on demand materials into practical training pedagogy.

Improvement occurred for at least three reasons: First, students could learn the training's purpose, content, flow and notable points in advance. Second, as on demand learning materials can be viewed anytime, anywhere and as many times as necessary, availability and convenience led to firm establishment of students' knowledge. Third, because image training became

possible through on demand materials, and some students actively conducted such training, the overall training effect improved. We believe that the 2020 class acquired the knowledge and skills of actual ship training through on demand materials distributed in advance. In addition, knowledge and skills were firmly established probably because their actual ship training was imminent, students took the on demand materials seriously. We believe that combining on demand learning with actual ship training resulted in a synergistic training effect.

(2) As watching on demand materials anytime, anywhere and as often as necessary is easy, we believe that students accepted on demand learning, thereby improving their learning.

In taking advantage of on demand learning, contents of teaching materials can be viewed on smartphones, and the training effect is improved by combining video, audio and subtitles.

(3) Teaching materials used for on demand learning are more effective if they are based on videos and include explanations and subtitles.

In the on demand learning material, past training was displayed on one screen by synchronising the three screens of the bow direction image, the image inside the bridge and the ECDIS screen image. In addition, the captain's commentary with subtitles were inserted, such that it was a realistic and easy-to-understand teaching material.

Although the video material needs to cover the necessary content, a video should not be overly long because students might not watch it or watch it only once. In that case, the benefits of on demand materials will not be leveraged.

(4) Through on demand materials, students' motivation for actual ship training seems to have improved.

When watching past training, students seem to be challenged and become motivated. Watching other people manoeuvring and imagining one's own future manoeuvring seems to inspire students' performance.

(5) The most effective time to distribute on demand teaching materials seems to be about one week before the actual ship training; practical training is imminent, but students have time to watch the videos more than once, at their convenience.

We believe that watching videos multiple times can help students firmly establish their knowledge. They can watch important parts many times or skip parts that they think are easy or have already learned. In addition, students can watch the videos for confirmation just before training, even after boarding the ship. After training, watching them while reflecting can lead to self-evaluation and discovery of points for improvement. In sum, we believe that greater improvement to the training effect will result from devising the optimum timing and viewing method for on demand learning materials.

CONCLUSION

In regard to hybrid training, the instructors' evaluations and comments showed that the training effect improved compared to previous training without students' early access to on

demand materials. In addition, students' evaluations and impressions revealed that they favourably accepted hybrid training.

From overall observation, we inferred that training could be more effective, depending on the on demand learning materials' content, length, timing of use and so on. In addition, the combination of on demand materials and practical ship training better enabled students to take the initiative. We further believe that continued hybrid training and continuing to encourage students' initiative will enhance the training effect.

In the future, we would like to clarify how best to develop on demand learning materials and to combine them with practical ship training such that more effective training continues.

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