Distance Education for Seafarer Students:
Survey of Seafaring Community

Captain Siriwardhana Hirimbure, Professor Margareta Lutzhoft

National Centre for Ports and Shipping, Australian Maritime College, University of Tasmania.

Many academic courses offer distance study as an option. However, there are very limited such offerings for seafarer students. This paper presents the results of an investigation of the possibility of offering distance courses for seafaring students (cadets) who undertake their practical training at sea. The data were collected using an online survey of sixty participants representing cadets, junior and senior officers and ship masters mainly from Australia, Sri Lanka and Singapore.

Some respondents were highly appreciative of having an opportunity to study at sea while some others were concerned about availability of technologies and the availability of time for additional study. The study found that 69% of the respondents would like the opportunity to engage in distance education while at sea and consider it is helpful for their future learning. Nearly 80% of the respondents indicated that the available time for additional study for cadets over their normal working hours is between one and three hours. They also indicated (about 80% of respondents) that the perception of the employers for cadets to undertake distance study is supportive. Further the survey found that senior officers were highly supportive (24.4%) or supportive (48.9%) of cadets undertaking distance study while at sea. Respondents from the offshore industry indicated that they do not have enough time to do such study at sea.

Keywords: Distance education, seafarer training, seafarer attitude, and e-learning.

1. Background

"The key issue is identifying the starting line for each student and helping them progress by addressing, if possible, their individual needs. The goal is to "add value" by assisting student progress from their various starting lines"[1].

Distance education has emerged in response to the demand from both employees who intend continuous professional development and those who have limited access to required further studies. According to Beldarrain [2] distance education is developed in order to provide access to those who are distanced and not be able to participate in on campus courses. Distance education opens up many new learning opportunities, and it gives a greater degree of control to the learner, which might have a significant effect on what the institutions offer to teach and how they teach. In distance education mode, the learner's position constitutes the centre of the universe in that teaching responds and supports learning rather than teaching. That means students have to take responsibility for their learning, in such matters as deciding when they will study and how much they want to study and seeking out information and resources. In moving to distance education, the role of the instructor will continue to change, some will have a job of preparing materials without being involved in teaching and some will learn how to use communication technologies and so teaching will become quite different [3].

According to the transactional distance theory of Moore [4], distance education does not mean simply a geographic separation of learners and teachers, but it is a pedagogical concept. It is a relationship that exists when learner and teacher are separated by space and time. Transactional distance varies with many contributing factors such as the strength of the relationship, behaviour of the teachers and learners, and other environmental factors surrounded by them. The transactional distance is reduced when the gap between people who are teachers and learners are reduced.

According to Muirhead [5] education institutions are required to plan for delivery of courses with caution by considering evolving information and communication technology. Good communication has always been a primary criterion for the successful teacher. Students learn in part by communicating their knowledge both orally and writing between teacher and themselves [6]. Communication plays an important role in delivering learning at a distance whether by mail, telephone, fax, satellite, e-mail or the Internet.

Most of the distance education providers have changed their delivery mode today to take the advantage of emerging technologies, so that distance education now offers blended learning opportunities or completely online delivery. Blended learning involves a combination of Internet and digital media with established classroom forms that require the physical co-presence of teacher and students. This was aided by the rapid development of the Internet as a potential course delivery platform and which enabled significant incentive for universities to provide distance delivery programs [7].

Information and communication technology (ICT) provides academics with an opportunity to create rich learning environments for their students, as a consequence many major distance education universities in Australia are now replacing traditional, print-based courses with multimodal types of courses, which involve the use of multimedia and ICT to develop dynamic course resources that appeal to different sensory modes and a variety of learning styles, for example, in both a visual and aural form. This strategy has shown that it leads learners to perceive easier, and to improve attention rates, and thus leads to improved learning performance [8-12].

According to Digital Ship (March 2013), internet facility is available to 68% of seafarers today. But how much this would be useful to learning objectives is not yet clear. Textbook or written class material can be replaced by online documentation, available on disk or downloaded from the Internet. Various types of e-book applications are also available depending on the learners' level of study [13]. Those computer based training (CBT) applications together with internet facility (if available) can look just like the hardcopy document, and the advantage of this system is that they can also include hyperlinks and jumps.

According to Moore [4], education systems need to be responsive to the specific educational needs of different ethnic communities, especially in the context of distance delivery. It is important to address issues related to different cultures to provide better acquisition of knowledge and skills [1, 14]. With regards to seafaring, maritime course delivery is usually undertaken using the English language. However, in other cultural settings the respective mother language may be used (e.g. Germany, Sweden). One of the main issues with the different cultural groups is to identify their understanding and enhance it by addressing their issues, and if possible their individual needs. This process may have an added value to assist student progress and overcome their initial difficulties [1].

Generally the use of emerging technologies and the attitudes of the learner and teacher in education represent assumptions about learning and they are often based on observations of the learner and the teacher without testing the actual learning outcomes related to the technology in use. One study on attitude [15] towards internet connected devices shows that students have differing views of the benefits of these devices. This research investigated the students' attitudes toward using mobile learning technologies particularly in relation to tablet computers, e-textbooks and learning management systems (LMS) on mobile devices. Findings have shown that students feel there is benefit in blended learning with internet connected devices used during class. While 12% of students said there was "little benefit" or "no benefit at all", 88% said there was "reasonable benefit" or "lot of benefits". When asked about distraction from using mobile devices, 64% indicated there was "distraction" but 36% said "a little or no distraction". When asked whether the iPad motivated them to learn, 54% said "it did not, or sat on the fence", and 46% said it did. Similarly, 48% said the iPad "gave me an advantage in the classroom," while 17% did not think so and the rest were neutral; 44% said the iPad "improved my study habits" while 21% did not think so and the rest were neutral".

In the context of seafarer learning at sea, as the physical distance increases, it leads to a communication gap, a psychological space of potential misunderstanding between the players which therefore needs to be bridged by carefully selected teaching techniques[3]. Traditional learning approaches will not have the capacity to meet the distance education needs for seafarer students who would like to study at sea. Work place compulsory training programs and on board workloads have increased the gap of the distance learner in that environment. Therefore the significant technological development and its new approaches need to be considered in the future delivery of distance courses for seafarer students.

Seafaring training programs have varying degrees of sea-time requirements and shore based learning requirements in different countries. Figure 1 illustrates the seafarers study pathway offered at the Australian Maritime College (AMC) in Australia. Generally it takes minimum of seven years to

complete nautical study requirements to be qualified as a ship Master. It would be potentially advantageous for continuity of learning, and to speed up the learning process if the students could undertake some of the 'phase three' studies shown in the figure 1, whilst on board ship.
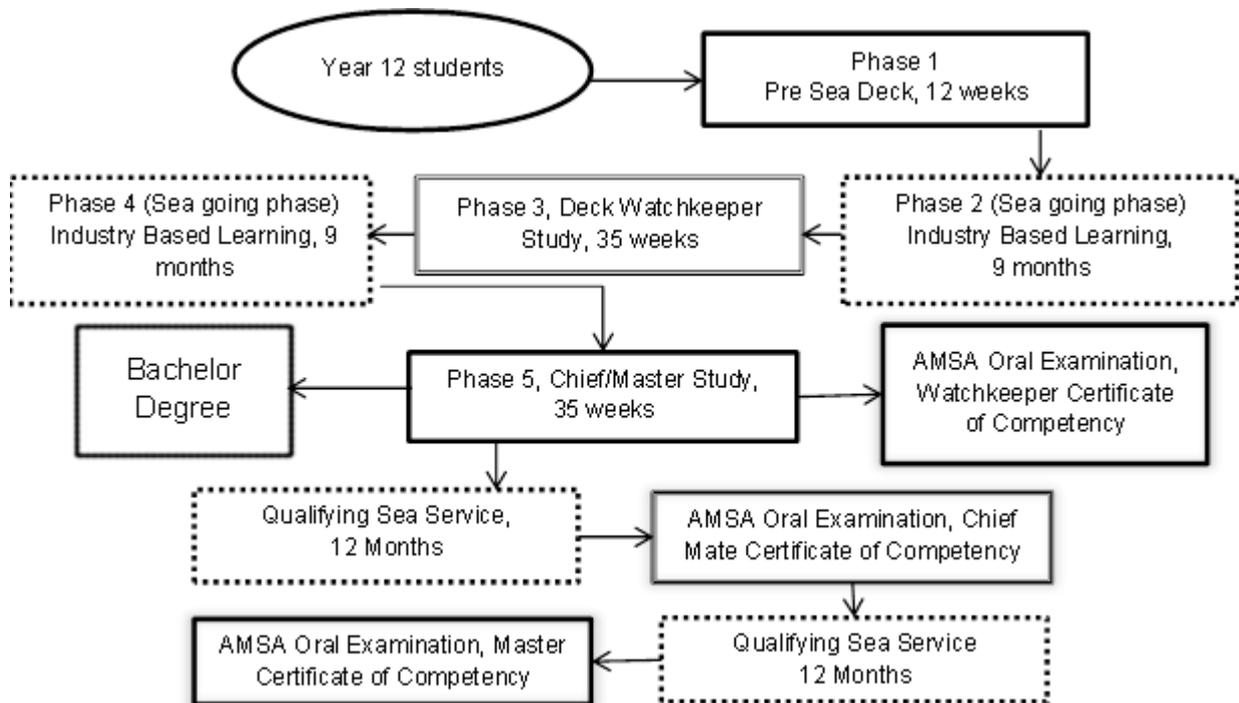
Figure 1: Seafarers study path way offered at AMC in Australia.
Source: adopted from AMC course informations [16]

This project investigated the possibility of offering distance courses for seafaring students (cadets) who undertakes their practical training at sea. Thus the objectives of this project is to develop one or more units for these students to undertake during their seagoing phase at a time and several units during their cadet period, utilising best possible learning and teaching strategies, and capitalising on available technologies. It also investigated how feasible is it to assume that students have periodic internet access that could be used to encourage continuous communication.

2. Methodology and data collection

A convenient method of data collection was used (web link) primarily to collect data from known maritime institutions. Some institutions in less develop countries had difficulty in using this method and therefore researchers were unable to receive good number of responses from those institutions.

2.1 Procedure

A structured questionnaire was developed to collect data samples. The survey questionnaire was pre-tested with 20 AMC students who had partly or fully completed their cadet training at that time. Therefore based on the responses the questionnaire was refined.

The final questionnaire was disseminated mainly through seven known contacts at various maritime (seafaring) related organisations. They were requested to distribute the questionnaire among seafaring members of their organisations. A Web link was sent by e-mail to each participant through the contact person of the organisation and directly through e-mails to known seafaring students. In addition a sample of 80 seafarer students, which included watch keeper and master/chief mate level students, was chosen from the AMC student data base. Out of seven locations for which the questionnaire was distributed, responses were received from five locations; namely AMC seafaring

students (40 responses), Singapore Polytechnic (2 responses), Australian shipping companies (6 responses), Ceyline Shipping (10), Colombo International Nautical and Engineering College Maritime Campus (1), and University of Moratuwa, Srilanka,(1). The response rate from seafarer students at AMC was 60.8%. The responses were stored in the Survey Monkey web portal and the results were analysed using SPSS statistics software.

2.2 Analysis

Data analyses were carried out mainly to cross check different group responses. Most of the graphs were produced using Excel sheets. The original size of the open ended comments was over 5000 words and they were filtered to about 2500 words by removing repeated comments. Open ended answers were categorized under various indicators such as positives (32), negatives (18) and questions (6).

3   Results

The results shown in this paper are limited to the findings regarding the attitudes of the seafaring community to distance study. The use and availability of technology and several other findings of the survey are not presented here.

3.1 Sample characteristics

The composition of the survey response was that 60.8% of them were current students of the AMC and 17.6% were ex. students (seafarers) and 17.6% were cadet training officers and the rest 11.7% were employers or managers of the shipping companies. Nearly 58% of them had over five years of experience at sea, out of which 24% had 20 years or more experience. There were 8% with three to five years of experience and 34% of the respondents had less than three years of experience at sea.
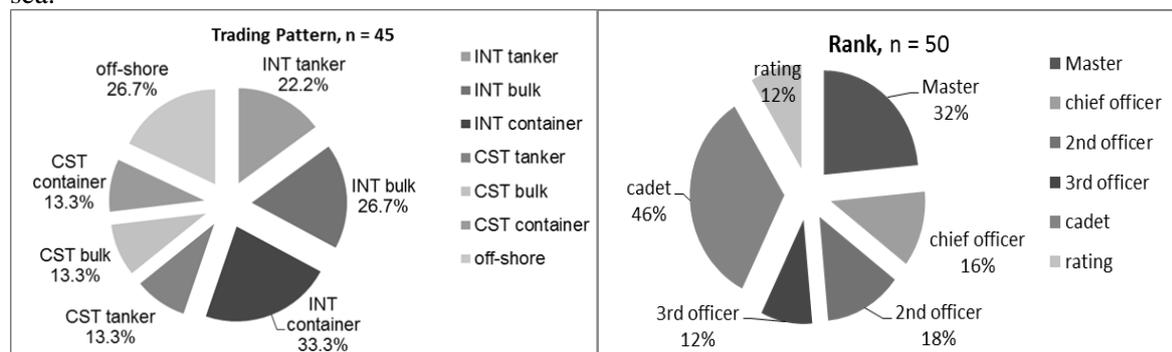
Figure 2: Composition of the participants: trading patterns and ranks

Among the respondents, (Figure 2) 78% were certified officers from different ranks, 46% were cadets and 12% were ratings and of the participants 66.7% used English as their first language and 33.3% used English as their second language.

Analysis of data on the respondents' view on providing an opportunity for distance study for cadets revealed (Figure 3) that over 69% of respondents considered it helpful. About 12.5% indicated it is not helpful at all, while another 8% of respondents had no awareness of the benefits. More importantly 54.8% of respondents indicated that the opportunity to engage in distance education during a cadetship enables them to satisfy both sea time and academic requirements stipulated by the regulatory bodies in line with Standards of Training, Certification and Watchkeeping (STCW) requirements. In addition 21.4% agreed that it also involves financial benefits to cadets and 19% agreed the overall period to complete maritime training could be reduced.

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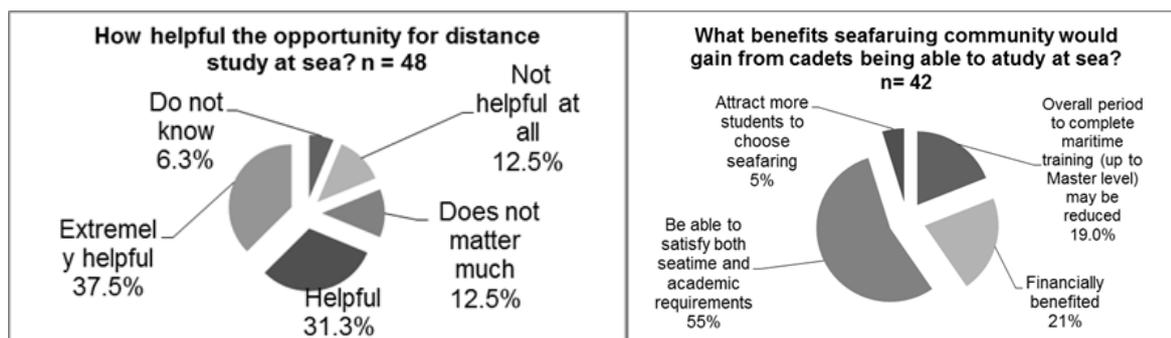
Figure 3: Opportunity and benefits as viewed by the respondents

3.2 Time availability for additional study

With regards to the time period cadets spend at sea in one contract, 14.6% spent about three months, 52.1% spent more than three months and 33.3% said it varies with the company. With regard to the time that they spend at home, 42.6% said it varies, 29.8% said it would be about three months or more than three months, 19.1% said it is less than a month and rest of the respondents, 8.5% said they stay about two weeks at home.

With regards to the time cadets would be able to spend on additional study over normal work hours, 6.3% stated their availability is less than five hours per day. However, 37.5% stated their availability is less than three hours while 45.8% stated availability of about an hour. Notably, 10.4% indicated no additional hours available over normal work hours.

A comparison of the seafarers' trading pattern against the available time for additional study (Table 1) revealed that there is a direct relationship. Respondents from the international trading group, 53.3% said that they have less than three hours for additional study and 61.8% said that they have only one hour for additional study.

Table 1: Hours available for additional study against trading patterns

Trading pattern	Hours available for additional study			
	1 hour	less than 3 hours	less than 5 hours	not available
International tanker	19.0%	26.7%	0.0%	0.0%
International bulk	19.0%	13.3%	0.0%	0.0%
International container	23.8%	13.3%	0.0%	25.0%
Coastal tanker	4.8%	6.7%	0.0%	0.0%
Coastal bulk	4.8%	6.7%	33.3%	0.0%
Coastal container	4.8%	6.7%	33.3%	25.0%
Off-shore vessels	23.8%	26.7%	33.3%	50.0%
% of Total	48.8%	34.9%	7.0%	9.3%

Serving officers indicated (Table 2) that they viewed time availability for cadets was about an hour. However, there were different views when time availability of less than three hours is considered. Masters and 3rd officers indicated that cadets could have up to three hours availability but chief officers and 2nd officers did not agree with this view.

Table 2: Hours available for additional study viewed by ranks

Rank	Hours available for additional study			
	One hour	less than 3 hours	less than 5 hours	not at all
Master	46.7%	40.0%	6.7%	6.7%
chief officer	57.1%	14.3%	14.3%	14.3%
2nd officer	55.6%	11.1%	11.1%	22.2%
3rd officer	40.0%	40.0%	0.0%	20.0%
cadet	45.5%	31.8%	4.5%	18.2%
rating	33.3%	50.0%	16.7%	100.0%
Total	46.8%	36.2%	6.4%	10.6%

3.3 Respondents views of subject suitability

The respondents' view of the subjects suited to distance study by seafarer students in order of their rank are shown below with percentage agreement in brackets.

1. Navigational Watchkeeping (bridge watchkeeping, basic ship manoeuvring), (34.8%)
2. Bridge Operation (bridge equipment, weather, nautical knowledge), (19.6%)
3. Marine Transportation (cargo operations), (23.9%)
4. Near Coastal Navigation (coastal navigation, voyage planning), (23.9%)
5. Electronic Navigation, (21.7%)
6. Ocean Navigation (off-shore and celestial navigation), (21.7%)
7. Electronic Navigation, (21.7%)
8. Ship Stability (26.1%)

3.4 Number of subjects and preferred time period

The respondents' view of the number of subjects (Table 3) suitable for distance study shows 37.2% for one or two subjects and 44.2% for two or three subjects. The time frame to complete one or two units was considered to be 12 weeks by 9.3% and 24 weeks by 20.9%. The time frame to complete two or three units was considered to be 12 weeks by 11.6% and 24 weeks by 23.3%. Comparison of the number of subjects against required time (for two subjects) indicated that the respondents' view is more biased towards a 24 week study period.

Table 3: Number of subjects and preferred time period for study

No.of Subjects	Number of subjects and suitable time			
	12 weeks	24 weeks	36 weeks	Total
One or two subjects	9.30%	20.90%	7.00%	37.20%
two or three subjects	11.60%	23.30%	2.30%	44.20%
Three or four subjects	7.00%	2.30%	4.70%	14.00%
More than four subjects	4.70%	4.70%	2.30%	11.60%
Total	32.60%	51.20%	16.30%	100.00%

3.5 Expectation of Cadets from the Employer

The respondents' view on required support from the employers for cadets to undertake distance study (Table 4) indicated that allocation of reasonable time and to have supportive facilities for distance learning (e.g. web access) are the most important and nearly quarter of the respondents agreed to the reduction of the work load requirements and to the financial support requirement for distance study.

Table 4: Support expected from the employer

Support required from employer	Response Rate
Financial support for distance study	26.70%
Allocation of reasonable time for distance study	80%
Provide supportive facility (e.g: web access)	62.20%
Reduce work load on vessel maintenance activity	31.10%

In relation to the willingness of employers to support cadets to undertake distance education results show that (Table 5), 80% employers were supportive, 20% were not supportive. The willingness of the employers to provide financial assistance for distance study showed that 66.7% employers were supportive, 33.4% were not supportive.

Table 5: Employers willingness to support

Requirements	Highly supportive	Supportive	Moderately supportive	Not supportive	Highly unsupportive
Employers willingness to support Cadets undertake distance study	22.20%	33.30%	24.40%	6.70%	13.30%
The willingness of employers to provide financial assistance for distance study.	6.70%	22.20%	37.80%	17.80%	15.60%

3.6 View of the participants about Senior Officers support

Results show that 24.4% of the senior officers were either highly supportive or 48.9% supportive or 17.8% moderately supportive. This common view indicated that generally senior officers 91.1% were supportive for cadet to undertake distance study at sea.

4. Discussion

One of the respondents to the survey had said "*It would be good to undertake distance study given that we are able to reduce our College time and we are provided with an appropriate time frame to complete the distance units*".

There were many problems with early attempts to introduce on line learning technologies for distance education, but continuous improvements and the hard work of the educators made it possible for the deliveries of complete units by on line distance education systems[17]. Some respondents assumed that existing conditions do not have a place in on board situations, but overall results of the survey suggests that there is a lot of scope for seafarers distance education programs. One of the main questions of the survey was to identify benefits the seafaring community would gain from distance study programs. A result suggests that the majority agreed with the idea that distance education would be able to satisfy both sea time and academic requirements of the seafarers. Responses (69%) indicated that having opportunity for distance study is helpful for seafarers. Review of the literature identified that similar responses to the study conducted on seafarers views of CBT, [18] indicated among positive respondents that (97%) of them agreed it was interesting and 87% agreed it was educational.

Cadets' time spent at sea in each contract, home stays and the time for additional study vary with trading patterns and with different shipping companies. Analysis of survey figures indicated either the cadets had one hour (46%) for additional study or (38%) for less than three hours. Variation of these figures in different trading pattern is mainly due to work load and their management by the respective shipping companies. The majority view suggests that they prefer the option of two to three subjects for distance study at sea, and nearly half of the respondents indicated that they would prefer to have 24 weeks to complete the study. This reflects time availability for cadets to spend on

additional study at sea. This has been recognised by one of the previous studies and according to Batrinca & Raicu, [13] one of the main barriers against development of distance education in the shipping industry is the increased workload which is common place on almost all type of ships. Chalmers University [19] revealed in an European union funded project about CBT programs that over half identified insufficient time as a problem associated with this form of on board training. Respondents also indicated (80%) that the most important support cadets require from the employer is the allocation of reasonable time for distance study. Though it is true that the time management is an important factor with most trading patterns, there are other views about the opportunities and the time management for distance study. After the analysis of the respondents comments the following were identified as valid comments for consideration.

- *"It depends on the individual student and their relationship with senior officers".*

- *"It would be good to undertake given that we are able to reduce our college time and we are provided with an appropriate time frame to complete the distance units".*

- *"Cadets should do if possible at least one distance study every six months and I think cadets should take final exams at AMC".*

- *"More attentive program can guide students to follow up these tasks much closely".*

- *"It depends on the cadet's motivation. I met so many cadets and they want to watch the movies rather than the books"*

From the above comments and the research carried out on blended learning by Brand, et al., [15] suggests that students' performance varies with age and self-managed learning attitudes and were important covariates with academic success.

Respondents view and the ranking of suitable subjects for distance study at sea suggest that their preference in order were practical subjects. However some of the open ended comments had different view for selecting subjects and one noted that "*It is a great idea for a few subjects like Bridge Equipment and Basic Engineering and Ship Structures but the subjects like Stability and Ocean Navigation need the full time of classroom for study".* These different views need to be carefully analysed against the general views of the other participants and with the findings from the other research carried out in this area.

Among the facilities cadets would like to receive from the employer, other than the allocation of reasonable time, it showed that they would like to have supportive facilities such as web access for their studies. This is a management issue that is required to be taken up with shipping companies. Rapidly developing technologies in the communication sector means, the possibilities of taking attention of the operators and providing support for the distance education for cadets at sea is not far from reality.

One respondent commented that "*There needs to be greater understanding of the role of the cadets and shipping companies should have greater responsibility towards the training of the cadet, as the college is able to offer limited services to the cadet whilst he is at sea".* This suggests that understanding of the learning requirements of the cadets and the willingness to support cadets studying at sea is critical. According to the results of the employers and the senior officers, willingness to support cadets for distance study is positive, but approval of the shipping company for a particular cadet to enrol in a distance study program is very important.

Dedicated training ships were more common in the past. Learners were put in the environment where they were going to work and learn together with the support of the instructor for their training on board. In many cases government supported departments ran these projects and cadets were given the priority for their learning. Most of those cadets were seemed to be very successful in their careers. Comparing this approach to cadets trained in private shipping companies the following differences were noted:

a. Cadets have to do their learning ashore.
b. Even if they can learn at sea there is no proper communication between the lecture and the learner.(Interaction)
c. Management may not consider giving reasonable time to study at sea.

d. TAGS program (Australian Cadets) is another work load other than maintenance work put on them to comply with reduction of sea time.

The training ship model is not a realistic proposition in the current shipping environment. However, the actual gaps between these two models today are:
  i Communication gap between the learner and the teacher.
  ii Employer's attitude towards cadet training programs at sea.
One of the failings in the practice of training and assessment of competency today is that seafaring students are examined outside their working environment and there is no procedure in place to measure their actual workplace performance standards. On board training and examination and "the cumulative record of the success of ability of doing all the required standard of competency can act as the prima facie evidence for administrator that the students is competent and eligible for the certificate of competency" [20].

According to Gholamreza & Wolff [20] it is important that the IMO and the examination administrators have to do more than just prepare guidelines regarding CBT but they have to arrange a proper transition process to this training concept. This transition from traditional face to face study to blended learning methods together with internet facility is opening the way to continue study at sea, spend less time studying ashore, and quite possibly improve competency. Respondents' positive view (69%) suggests that distance learning at sea can be used not only for actual study, but preparing for studies, again considering the unique availability of the ship environment and the professionals there.

5. Conclusion

This study reveals that there are groups of students who would like to engage in distance study at sea and there are other groups who identified issues to prevent them engaging in distance study. A categorisation of free text comments shows a number of thematic areas that should be considered for the design of a distance study program. These views underlie the attitudes of future student and mentors and therefore are important considerations for future course design.
The comments are listed in no order of priority.

- Time and time management is a major issue, as the survey also shows. The cadets will need support in being given enough time to perform studies. On the other hand, motivation seems to play a role – some comments indicate that officers perform self-study of subjects of their own choice.
- Internet availability must be addressed and solved.
- The subjects should be chosen to fit distance learning, also taking into account the availability for practical exercise or complementary work on board. This could include integration with existing programmes such as Tasks and Guided Study (TAGS).
- Support from academy, officers and organisation should be ensured.

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