

MET AND INDUSTRY – GAPS TO BE BRIDGED

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Abstract. It is not a new contention that too many ‘products’ of MET globally, do not appear to possess an holistic portfolio of skills and attributes. The demands placed upon a modern professional maritime practitioner are not being met by what is being produced by the maritime educational and training establishments. The various stakeholders within the industry are often quick to point the finger of accusation. Employers claim the ‘product’ of training is not adequate for the work and will imply the colleges and academies are not fulfilling their part of the bargain.

Regulators, such as Port State inspectors, may feel the same and feel no reluctance to voice their concerns. Commercial ships inspectors, who claim to be attempting to raise the standards of commercial practitioners, appear to place unrealistic demands upon the practical abilities of ships’ staff. MET institutions may share this view and they, in turn, claim the ‘raw material’ they are obliged to mould into a competent seafarer is deficient in the basic skills of mathematics, physics and linguistic articulation. This paper attempts to analyse the holistic nature of an adequate product of MET, identify these abstract qualities and suggest methods of contributing them to the MET process.

1. INTRODUCTION. WHAT CONTRIBUTES TO THE HOLISTIC SEAFARER PRODUCT? WHAT IS THE EMPLOYER AFTER?

The employer, the shipping company, requires holistically developed individuals who retain social skills. They are looking for individuals who will know their limits and when to ask for assistance. They want individuals to take on the responsibility of making decisions and living with the consequences of those decisions.

Numerous recruitment sources, such as the Courses and Careers for UK School Leavers, cite examples of the required personal qualities as being “prepared to accept responsibility not only for making important decisions yourself but also for inspiring confidence in the crew” [1]. They go on to list additional qualities such as knowledge, leadership, communication and team-working skills in order to “keep complex systems running in extremes”.

Employers require their staff to be able to synthesise the mutual objectives of safety and commercial success and how, most expediently, to achieve both. They will need to become familiar with and implement Quality Management and Safety Management Systems and to be conscious of corporate image and how easily it can be damaged.

They will need to understand the consequences of ill-prepared approaches to work and to be observant, to record and note operations in the correct detail. They will need to understand the continuous nature of the work and the importance of maintaining the operation.

Staff have to understand the significance of safety and protection of life at sea, on board, of their fellow crew, of the cargo and of the environment. They will have to protect the cargo, maintain it in an acceptable condition and to carry out tasks, as well as safely, economically and efficiently.

Employers will want their recruits to develop skills not practiced elsewhere and to supplement skills that were. This could be with both electro-technical equipment and more traditional manual type of equipment.

They will want these staff to be capable of Independent thinking, to utilise analytical skills and be able to apply skills and knowledge learned elsewhere. They will need to synthesize skills and knowledge learned elsewhere by way of a constructivist approach to this gained knowledge. They will have to analyse problems, engage in troubleshooting and to investigate causes and apply solutions and to communicate these with necessary staff.

They will have to exercise self discipline, rest, personal hygiene, drink, if there is any and to learn to learn, to study and to take the responsibility of finding information, rather than to be spoon fed. They will need to take the opportunity to practice, e.g., use of the sextant, compass errors, passage planning, other ships' equipment.

Employers will want their trainees to develop (construct) an understanding of the ship's operation and their part in it.

They will need to develop (construct) an understanding of their part of a departmental team and on a larger scale, a shipboard team and to understand their responsibilities in both technical and non-technical arenas. They will evolve to understand their own role and participation in the shipboard team and the management of the ship. In the same light they will also need to nurture the relationship with shore side management.

They will have to integrate into the working of the ship's operations in terms of both technical accomplishment, working equipment and non-technical skills, teamwork and to develop cultural understanding, both on-board and ashore and to develop tolerance.

They will be required to develop managerial skills, of people resources and equipment and to develop leadership skills, fairly early on.

They will have to accept and delegate operational instructions as appropriate. It is no co-incidence that human factors have taken so long to appear in the curricula of maritime training. Intertanko's Tanker Officer Training Standard (TOTS) includes a human factors section early in the proposed programme and there is good reason for this. There has been very little of this incorporated into college / academy work. Only now are non-technical topics starting to appear in training schedules and the human factors in TOTS, which will, to some extent, be incorporated into STCW in due course. The American Bureau of Shipping (ABS) Classification Society Crew Resource Management (TOTS) [2] Course identifies such significant factors.

2. WHAT IS FAILING NOW THAT DIDN'T FAIL IN THE PAST?

"As everyone in shipping is aware, the global shortage of seafarers, especially officers, has already reached significant proportions and is now a source of genuine concern to all involved in the industry".

IMO Secretary-General Efthimios E. Mitropoulos (IMO, 2008) [3].

Most of my MET colleagues and I, when considering our own apprenticeships, recall an environment which was conducive to training. The companies were used to cadets on board their ships. By the "companies", I mean the office administrators as well as the ships' staff. This does not always seem to be the case these days.

In some instances, there appears to be no structured apprenticeship at all. My own experience as an apprentice with an 'oil major' was a relatively positive one, certainly in terms of preparation for a job as an officer. Recent research suggests similar experiences still exist but on an arguably smaller scale. Just about every ship in the fleet was used to cadets not just in terms of berths / cabins but the other staff on board. Outside of working periods, where certificated staff were familiar with the task of training and teaching the job, cadets had study periods, working on correspondence courses prepared by the maritime

colleges. During quiet periods on bridge watches, traffic or buoyage situations were presented (with teaching aids provided by the company) e.g., magnetic ‘smartie’ boards, depicting vessels’ lights.

The culture and social environment in which a cadet lived and worked on board a company ship, was directed toward their learning and development. It was an archetypal example of ‘Activity Theory’ .“that human mind comes to exist, develops, and can only be understood within the context of meaningful, goal-oriented, and socially determined interaction between human beings and their material environment”. (Ryder, 2008) [4].

The lack of value placed upon an apprentice by the employer seems to be a frequent complaint now. Many a case of anecdotal evidence come from my university colleagues whom tutor maritime apprentices, between spells away on ships. Other ship staff appear entirely disinterested in their development as potential officers and they are left to shadow a crew member who may not even speak the same language.

It was a common, though not always well founded, observation that cadets’ labour was abused – an imbalance of chipping and painting instead of picking up technical skills. Though basic skills should be experienced, so they will never make a request for job they haven’t done themselves a healthy balance of practical maintenance work and technical operation should be the basis of a cadet’s day to day employment.

The apparently simple task of having an agent meeting them at an airport and co-ordinating the joining of a ship appears to be beyond the capability of some employers. No wonder apprentices become disillusioned, when treated in this manner early in their sea-going careers. It’s easy to criticise what looks to be a lack of backbone and adventure but the more thrifty employers, reportedly, often over look such considerations.

The alarming rate of attrition of 15 % (Smith, 2009) [5] is reportedly due to poor working and living conditions on board and a lack of value placed upon apprentices by their employers. The experience of these cadets on board is not good, compared to one working for a more major employer.

The monthly trade journal Maritime Executive Magazine (2009) [6] reports on a three day workshop organised by Intertanko and the ITF for young seafarers. Their conclusions indicated concerns of the following issues:

- Attracting people to go to sea;
- The criminalisation of seafarers;
- Piracy;
- The importance of shore leave access;
- On board training;
- Safety and security on board;
- Job security and employment related issues;
- Accommodation standards;
- On board living conditions.

Does the experience of apprentices vary between cadetships offered by Ship Owners and those by Management Companies? (Smith, 2009) [7]. Empirical evidence suggests there is a difference, with the latter offering a less comprehensive apprenticeship.

Before we fall into the trap of stereotyping the employers in this way, we might also seek to understand the pressures imposed upon them by market conditions. The difficulties and concerns expressed by the trainees, above, are not exclusive to the young seafarer. Some of these factors affect the employer at large.

This is certainly so in terms of trying to attract persons of appropriate age and education into the industry. The result of this obstacle is that the bar is lowered. Since so many berths have to be filled, the less capable candidates are taken on. The problems encountered by the employers are not exclusively with apprentice numbers but certified officer numbers.

With the dearth of certified officers having become a significant problem, more flexible training programmes have been established of a shorter duration than in the past. Therefore, the problems articulated above are being addressed with some degree of success yet this approach has brought in more problems. It's almost like a risk reduction measure, where one might ask, "Have further risks been introduced?" In this case, one might conclude, quite possibly.

This is perhaps where the complaints of the MET establishments come in regarding the quality of the 'raw material', a point which is addressed in section five of this paper.

A view of some observers, commonly MET establishment tutors, is that there is too much fast-tracking through an apprenticeship. Whilst individuals may end up with a pile of certificates and qualifications, they have very little experience. Being promoted way too early (I only spent two trips as second mate myself) is largely due to lack of qualified staff within the employers workforce. So the net experience possessed by the qualified work force plummets.

Qualifications are no substitute for experience.

The lack of seafarers globally and especially qualified officers has been a continuing theme in the industry for a long while. This creates a dilemma, in that the industry has to appear to be attractive to school leavers (to comparable careers) at the same time as being safe and cost-efficient.

The allure of post-sea qualifications, as espoused by the Nautilus Telegraph (2009) [8], gives the potential recruit the choice of pursuing shore-based careers beyond sea-going careers. Though it may be argued this move may be counter-productive it would achieve the objective of bringing much needed staff into the industry. This possible counter product may not materialise, as evidenced by Phil Smith's study (2009) [9] since many newly qualified seafarers expect to leave the sea in the short to medium term for a variety of different reasons.

The lack of recruitment into the shipping industry has long meant a knock-on effect for peripheral interests.

"After successfully lobbying, the Chamber of Shipping is pleased to see that the Migration Advisory Committee has recognised that ship and hovercraft officers are a shortage occupation in the UK in its report – Skilled, Shortage, Sensible: The recommended shortage occupation lists for the UK and Scotland". (Springett, 2008) [10].

So to solve our own dilemma will assist others.

There seems to be a sense that since training became de-regulated, standards have lowered. More training establishments from a more diverse spectrum of cultures and nations have developed. Much training has developed from non-traditional maritime cultures which have been priced to compete with the more traditional ones. The cheaper the training option, often, the lower the quality. The cheaper options tend to concentrate on quantity rather than quality and what is good for mass production standards is clearly not good for today's maritime employer. It is the non-technical skills which tend to be forgotten. Behaviourist, surface learning-by-numbers training tends to prevail.

The notion of an officer apprenticeship does not seem to exist anymore, on the same scale as it has in the past. There are very few employers asking that apprenticeships become extended in duration. They want their cadets trained quickly and cheaply, the quicker and cheaper the better. In the past, shipping companies were like big families in which staff would remain all their working lives. Indeed, many large

shipping companies were family concerns. Promotion was slow but by the time it was achieved, the individuals knew their job well.

Now training seems to be completed as quickly as possible. Whomever offers a training programme, someone else will offer it cheaper, even if it means going to a distant location. I witnessed the change of ratings from European, to Filipino to West African. Now even Filipino ratings are considered too expensive by many so Vietnamese are being lined up to take their places.

“Vietnamese seafarers have earned a reputation as industrious, highly educated workers and can serve aboard international merchant vessels” (MOL, 2006) [11].

They’re also cheaper than many.

NYK currently employs about 180 Vietnamese seamen and plans to substantially increase the number of Vietnamese seafarers in its ranks (NYK, 2006) [12].

Vietnam, a nation currently developing fast in the maritime arena, is not considered to be a traditional maritime nation. These are indications of some of the obstacles over which the nation had to climb. Partly as a result of this a 1999 report on MET in Vietnam included the following observations related to “poor and obsolete training programmes and syllabus” and “with outdated theories”. Though the graduates from these MET institutions may be well qualified, they “lack hands on experience” and “are completely unexposed to actual working environments”. They are “handicapped in passive working attitude” and “a poor sense of responsibility”. The Merchant fleet of the country was reported to be “tiny and obsolete”. (United Nations Economic and Social Commission for Asia and the Pacific, 2000) [13].

So what improvements were suggested? They included improvement in “teaching methodologies” and the aim to have teaching staff attain higher academic qualifications.

Programmes were established to encourage teacher exchange with Australia, the US and UK. It’s no coincidence that these are nations with a more traditional seafaring heritage. Individual Vietnamese ship owners have also been encouraged to develop in-house training programmes. So this is how they are approaching their perceived short-comings. We must resolve to make good our own short-comings.

It is estimated that about a third of the seafarers currently manning ships around the world are Filipinos.

But this dominance is continuously being challenged by other nations like China and Vietnam who can settle for lower pay and poor working conditions”. (United Filipino Seafarer’s Union, 2004) [14].

It is not only the rise of Vietnam in terms of the provision of seafarers that is noteworthy. They harbour aspirations of competing with Hong Kong and Singapore on the provision of transshipment facilities. (John, 2009) [15].

The relevance to this article is that as far eastern countries gain in confidence, they will compete with the more traditional sectors of the world in maritime business. The concern is, will they be accompanied by the traditional maritime values?

3. HOW CAN THE MET PROCESS IDENTIFY THE NON-TECHNICAL QUALITIES REQUIRED?

As alluded to earlier in this paper, when I think back to my own apprenticeship, most non-technical skills were acquired at sea. By any comparison, sea staff including trainees, re given more responsibility earlier in their careers than most of their counterparts in other industries. The professional activity of their ship mates lends itself to this objective, which becomes mutually beneficial. A facsimile of this is very difficult to achieve during the periods at the MET institutions where are manifestly not so suitable for the objective. Acting as ‘Leading Cadet’ for an accommodation block hardly matches the type of responsibility for monitoring cargo or navigation operations. Ultimate responsibility for decisions may

not rest on the shoulders of the trainees but the sense of importance of the operations will be clear. These factors will be much more challenging to reproduce at a college or university.

So what can be done at MET establishments? It is a common observation that highly sophisticated simulators may be provided but the value of their use does not correspond with their sophistication. For example, the realism that may be simulated is of little value unless the student actually learns from its use. The de-briefing session following an exercise is arguably the most significant part of the programme. If that part is not conducted purposefully, then the investment in realism is wasted. There is nothing modern about this view. The 1997 NI publication MET A Practical Guide (The use of simulators as tools for training and examining seafarers) [16] declares that the effectiveness of the training depends more on the instructor than the simulating hardware.

It's really up to the employers to supplement the technical education with experiential learning and nurturing.

The social and responsibility skills are more suited to on-board training, where the 'Activity Theory' will be more likely practiced. In terms of academic application and development it may apply whilst studying but within a more technical arena it will apply 'on-the-job'.

As mentioned earlier, the inclusion of more non-technical studies in the shore-based segment of the training, such as human factors, leadership, resource management. It would be appropriate for these areas to be covered at an operational level, not exclusively at managerial level. Problem-based learning, where analytical and critical reflection attributes are developed may provide the nurturing of desirable skills.

As explained elsewhere, the current situation in MET establishments seems to be driven by the employers demanding faster and cheaper training for their staff, rather than the academic pursuit of the establishments themselves.

As an alternative, another initiative is being taken; to try and change the culture of the industry from within. As an extension of this 'career path' post graduate degrees in ship management are starting to appear. In fact, there is nothing new about these type of post-graduate programmes but the way in which they fit into a career path may be new.

The very individuals whom have graduated from modern apprenticeships, may wish to progress along the academic path, for the mutual benefit of themselves and their employers. Then they will see the value of adequate and timely education and training and perhaps communicate these ideas to those above them, within a company hierarchy.

4. WHAT QUALITIES ARE SOUGHT BY EMPLOYERS BEYOND THE 'COMPETENCIES' REQUIRED BY STCW?

With logical reasoning, the STCW convention refers to 'competencies' rather than 'learning outcomes' as a more academic approach might. This seems reasonable, since the Organisation does not see itself as an academic dictator. However, employers may not regard 'competencies' as being enough. Whilst individual competencies may be verified, the employer is looking for trained apprentices with the ability to synthesise, analyse and apply themselves in different ways to different circumstances. Perhaps it is unfair to expect STCW to cover that area of development. Does the IMO accept that the industry at large (incorporating the employers, the commercial demands and the regulatory authorities) collectively require more than just 'competencies' being met? Is it not fair to say that in the past, ship-based sections of the apprenticeship dealt with these aspects?

Reviews of the STCW legislation are on-going, as is likely to be the case with the evolution of any meaningful legislation. Significant changes are planned to enter into force in 2010 but the monitoring of the effectiveness of the convention will not stop. Peter Brady, chairman of the IMO STCW sub-

committee recently observed that any further proposed changes should specifically “address requirements for effective communication”. (Brady, 2008) [17].

This is another example of non-technical skills (communication) being cited as an area in which to improve, interpreting the point as relating to communication between people, rather than by means of radio waves.

As is often the case, policy or even legislation changes, are dictated by tragedy. In the aftermath of the 2004 Bow Mariner incident, the owners Odfjell, “took the decision to manage its own ships, using an in-house team” (Storeng, 2009) [18]. It’s CEO Terje Storeng declared later, “you need skilled personnel. It’s about training, training, training. We’re on the right track in educating seafarers”. “Ships are complex, needing skilled officers and crew”.

So does that mean Mr Storeng is distinguishing between training, education and skills? Perhaps, if that were so, the provisions of the existing STCW competencies would have prevented this tragedy. The fact that it didn’t results in this CEO reflecting on the provisions of training, education and skills for the seafarers on his ships.

It is not an easy task to attempt to answer these questions but if we might refer back to the first reference in this paper, taken from Courses and Careers for UK School Leavers, then the personal qualities mentioned (leadership, communication and team-working skills) are examples of precisely what is not covered by the STCW ‘competencies’. As argued at the beginning of this section, the convention does not purport to do so and it is inappropriate for us expect it to in its present form. That is why there are more examples, again as quoted elsewhere in this paper, of such qualities being enhanced by non-technical training, such as specific crew resource and leadership training. It is widely mooted that precisely this type of training will be incorporated into the STCW convention in the future. That should re-assure the likes of Mr Storeng and his counterparts in other employers’ organisations.

In the meantime the gaps between what is produced by MET establishments and what is required by industry have to be bridged by other means.

5. WHO ARE THE STAKEHOLDERS WHAT, IN EACH CASE, IS THERE STANCE?

Charterers, who via ship inspection procedures, claim much the same, in that they often feel ships staff are not able to cope with the totality of demands.

Colleges and academies, who claim that the raw material they’re given to work with, is flawed. Their basic mathematical and communicative skills are inadequate when they leave school and start training.

The educational practitioners may complain at the poor quality of the ‘raw material’ but they have a commitment to be up to date with their material and to engage their students in the most effective way. Again, this relates to a completely different debate, beyond the remit of this paper. Nonetheless, that commitment should not be forgotten by the practitioners.

The academic and training (MET) institutions have a requirement to be able to deliver a quality product and quality experience to the students. If they don’t, students won’t attend, apprenticed company employees will not be sent there and they will fold. Just like shipping companies, MET establishments live on their reputation which can easily be tarnished. Just like shipping companies and traders, they have commercial interests and competition to consider as well.

Potential trainees who are not attracted to the industry because of its image, eg, pollution, criminalisation, piracy, lack of shore leave and security issues, as listed above.

The reputation of an MET establishment may also have an influence on which are chosen by sponsoring employers. Living conditions of the apprentices will be a major factor but so will available resources of the MET establishments. They often complain that their own resources are too low to offer a better MET

programme than they do. However, more resources and newer equipment does not necessarily make for a better MET experience.

There is evidence to suggest that the existing STCW Convention and even more specifically, tanker endorsements, do “not supply the level of comfort required” by the employers, the companies themselves. (Wilkins, 2009) [19].

The P&I Clubs and Liability Insurers have their own perspective on the current state of the industry. "As the liability insurers, we are conscious of the fact that human error plays a very major part in liability claims. With the sort of manning problems that are now being faced, it's only likely to become more of a problem (Bardot, 2007) [20].

In order to attract better quality recruits, employers, through MET institutions, have started to offer degree programmes, to supplement apprenticeships. On one hand, this may not solve the shortage of ships' staff for long, since newly qualified officers may wish to follow their career path ashore. On the other hand, gaps are filled temporarily and employers benefit from these individuals' experience of own company fleets. In addition, recruits of degree programmes may arguably be of a better academic quality. Naturally, this raises the counter-argument that ships' staff don't all need to be thinkers and academics. Ships need their fair share of craftspersons.

The introduction of degree programmes has been due partly as an attempt to raise the status of the cadet. For reasons mentioned elsewhere in this paper, a career at sea may not appear as attractive today as it has in the past, to the school leaver. So it has to ‘compensate’ by making the proposal more attractive. In other industries, ‘compensation’ is often made by offering higher salaries but this is not an option in shipping today, where a reduction of costs is more prominent.

So those employers that can afford it, offer a ‘career package’.

As specific demands result from the evolution of the shipping industry, knee jerk reactions occur. For example, the emphasis on the supply of LNG tankers and the training of their staff, has taken the industry by storm, not to say some surprise. So how does the industry respond? By building hundreds of new LNG tankers and then, afterwards, pondering on how they should be manned. So the authorities leap into action, setting out LNG training guidelines. Yet, there is actually no set standard. The SIGTTO standards “have been widely adopted but, since they are only providing a suggested syllabus with no standard of delivery or assessment” those standards are bound to vary between MET organisations. (Whitcher, 2008) [21]. MET institutions set what they feel is appropriate, so the standard is bound to vary. If the assessment pass marks were too high, not enough staff would pass and employers would send their staff to be trained and assessed at an institution which did pass them more regularly.

A review of literature centred on liquefied gas tanker training yields most interesting results. One copy of LNG World Shipping Journal (August / September 2008) includes a specific section associated with training. Study these quotations:

“The courses that work most effectively are those which are based on easily digested text;” “high-specification graphics and photographs that can be quickly absorbed” (Dawson, 2008) [22].

So the emphasis here is on *quickly*.

Two significant operators “have recently extended opportunities for [MET establishment] cadets to gain the requisite sea time on board LNG carriers to earn their LG dangerous cargo endorsements” (Urban, 2008) [23].

Dangerous Cargo Endorsements, as incorporated into the aforementioned STCW Convention and now more commonly referred to as ‘Tanker Endorsements’ were originally conceived for junior staff, with experience, prior to being promoted to a senior position. They were not created for apprentices, with very much less experience.

Describing a simulator based training regime, Soren Einar Veierland of Konsberg, (Veierland, 2008) [24] manufacturer of cargo operation simulator equipment, suggests exercises “can assist the industry in training a considerable number of crew within a fairly short time”.

Once again, the impact of speed is inherent within the observation.

Modern apprenticeship programmes are often highly modularised. This means that there is a danger of them developing coping strategies rather than learning strategies. They memorise, sit an assessment then forget, so the material of the next module is unencumbered.

6. HOW DO EXTERNAL STAKEHOLDERS PUT PRESSURE ON THE INDUSTRY? Eg, CHARTERERS' REQUIREMENTS VIA INSPECTIONS

With all the expense of training and crew well being, it is sometimes forgotten that shipping companies are in the business for business purposes.

To that end they will commonly tender for chartering arrangements, which, in the case of cargo ships (tankers especially) involve charterer's inspection. These inspections will commonly incorporate questioning of crew members, which adds more pressure to the crews' on-board experience. Though the subject matters on which the questioning is based are purely technical, the process can be quite intimidating and strong personal qualities are required in order not to be intimidated. Legitimately, vetting inspectors are merely attempting to ascertain the level of confidence with which ships' staff carry out their duties, though the process may appear more of a trauma to the staff involved.

One might reflect again on the reference made to cargo endorsements above and how their issue seems to have become engrained into the very early stages of training. Bearing in mind their original purpose, as depicted by STCW '78, is being distorted, one might suspect the vetting inspector principals to have had some hand in this distortion. After all, it sounds safer to hire a ship all of whose officers and cadets possess a cargo endorsement. Yet the endorsements are only meaningful in a legislative sense to the 'top four'.

On a more parochial front, certifying authorities such as those approving or even conducting examinations have an input. I have been horrified at the prospect of Masters' oral examinations being scrapped (Nautilus Telegraph 2009) [25]. Oral exams incorporate the added component of actually testing an individual's resolve and developing it by experience. The whole ethos of a Master's oral examination was to put the candidate under pressure. So it would be easy to tell if the candidate performed well under such pressure, since they would surely be subject to just the same when working as a ship Master.

CONCLUSION

Change is necessary but the key stakeholders, one might say the keyholders, have no apparent desire to change at present. Change from within seems to be the only plausible option to us. Employers wish to reduce the cost of filling vacancies. When poaching is not possible, they appear to bring pressure to fast track trainees. Then they complain that their trainees are not adequately developed for the industry. It's a viscous circle.

Yet change may be brought about from within, if shipping company staff can see the difficulties. They are the ones who have the influence to be able to change the culture from within the industry. Educators claim to be able to identify these difficulties but have little opportunity to resolve them, all the time employers put pressure on them to reduce the duration and therefore the cost of training programmes. If company staff, perhaps managers, are exposed to the difficulties from an academic view, then perhaps change from within the industry might be achieved. Appropriate training and education would be delivered over a realistic time scale, giving the apprentices an opportunity to develop the non-technical skills, as well as those competencies deemed appropriate by the STCW regulations and flag state administrations.

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