THE APPLICATION OF HUMAN FACTORS IN MARITIME EDUCATION AND TRAINING

Quentin N. COX

Captain, Senior Lecturer
School of Management and Post Graduate Studies
Warsash Maritime Academy Newtown Road
Warsash Southampton SO31 9ZL
United Kingdom
+ 00 44 1489 556292
+ 00 44 1489 573988
Quentin.cox@solent.ac.uk

ABSTRACT
There is nothing new or revolutionary about drawing human factors into maritime education and training. There has long been evidence that these human factors have been cited in incident reports as contributory factors within event chains leading to the incidents in question. What does seem to be a relatively modern development, however, is that a more holistic approach to analysis appears to have been adopted by both incident investigators, in their subsequent reports and educationalists, in their output.

One could justifiably claim that the original Standards of Training Certification and Watch keeping (STCW) legislation of 1978, was one of the earlier examples of evidence that human factors were taken into account, within formal legislation. It’s enhancement of 1995 did not detract from this original aim. More recently, the 2007 edition of the International Bulk Chemical (IBC) Code includes a substantial annex, concerning the management of health and safety, which uses terms such as executive management and leadership, employee participation and evaluation and continuous improvement.

These are terms which are have not commonly been used in formal maritime literature in the past. Yet it is not only more recent legislation that alludes to human factors. Incident reports have more recently and more frequently involved reference to cultural issues, for example, which have rarely been cited in previous reports. A very good example of this is the incident report into the casualty Bow Mariner, in which human factors are discussed at length and in number. There is a clear association between these references; we learn from our mistakes. Such accident reports have, perfectly logically, long been employed in training and education, in order that further similar incidents can be avoided.

This paper aims to identify the more detailed approach more recently apparent in maritime literature. There are examples of a change in approach to education and training, evidenced by journals and press, which incorporate attempts to empower learners to guide themselves in the learning process, either in the classroom or on board ship. Phrases such as student-centered learning and engagement are appearing more frequently. The approach is more holistic, in that the tasks being covered are contextualised into the broader aims of the training. Whilst a conditioned response from a learner might be desirable for a trainer or leader in the short term, a learner will not appreciate the meaning of the task within its wider context, whether within the function of launching a lifeboat, or a mooring operation, as examples.

It appears training, education and management are acknowledging the benefits of incorporating human factors into their outlook.

Keywords: Education, Methodologies, Analysis

1. INTRODUCTION
The incorporation of human factors in maritime training and education is not new. The IMO recognised the need to acknowledge the importance of the matter with the STCW Convention of 1978 and indeed its overhaul of 1995. However, it is noticeable that a different, perhaps marginally enhanced, attitude appears to have been adopted when the topics relating to technicalities of equipment or processes have been dealt with in the recent past. This paper aims to identify specific approaches which often come under the more generic heading of human factors. It goes on to discuss how these factors have been identified in approaches to maritime education and training, as well as in approach to management.
2. HUMAN FACTORS V TECHNICALITIES

The technical details of a ship’s machinery and equipment cannot be extracted from a learning syllabus, however they can be supplemented.

Quite rightly, investigative technical reports concentrate on the mechanisms and technicalities of incidents, particularly where the misunderstanding or misuse of equipment or procedure is evident.

The most recent edition of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk IBC (2007) in its section ‘Standards and Guidelines to the IBC Code’ includes a highly relevant annex entitled ‘Guidelines on the basic elements of a shipboard occupational health and safety programme’. It explains in its prologue that the Maritime Safety and Marine Environmental Protection Committees recognise the need to provide guidance for the implementation of occupational health and safety. (IMO 2007)

Within the detail of the guidance, qualities such as executive management commitment and leadership, employee participation and hazard anticipation, identification, evaluation and control are cited as being effective means of implementation. In addition incident investigation and systematic programme evaluation and continuous improvement are mentioned.

Indeed, where cause attribution has been possible in the investigations of the very tanker incidents which have led to recent re-appraisal of tanker training, human factors have appeared to play a major part. For example, the culture distances between the officers and crew of the ‘Bow Mariner’ was clearly a contributory factor.

Just scanning the USCG Technical Report Recommendations (USCG 2005) on the ‘Bow Mariner’ emphasises the point;

“Investigating Officer’s Recommendation 4: Recommend that [owners] review their internal policies and procedures concerning workforce interaction and co-operation, including but not limited to delegation of appropriate duties to qualified officers”.

Indeed the report includes Comments by the Maritime and Port Authority of Singapore, of which points 4, 5 and 6 read;

“It is recommended that the Company take measures to improve the shipboard social culture and to ensure social cohesiveness”.

“It is recommended that the Company de-brief the signed-off crew in [the relevant countries] to obtain feedback on shipboard safety culture, social cohesiveness, and operations”.

“It is recommended that the Company emphasize the importance of crew cohesiveness to senior [national] officers in the fleet through proper training programs e.g., team building”.

Deeper into the report, during a discussion on the use (in this case the negligence of) the inert gas system (IGS), the Chief Officer of a sister ship to the Bow Mariner ventures that irrespective of international, national or company requirements, regarding the need to use IG, “30 years of chemical tanker experience” was all he needed to perform his job. (USCG 2005) Once again, human factors come into the analysis in addition to the technicalities of whether IGS should have been used or not.

Section 2.8 of the report is entitled Shipboard Culture. It highlights the observation that though orders issued from senior officers were expected to be followed to the letter “the distinctions between the Greek senior officers and Filipino crew were remarkable”.

“Filipino officers did not take their meals in the officer’s mess, were given almost no responsibility and were closely supervised in every task”. (USCG 2005)

The report used for illustration an incident where a newly joined second assistant engineer was chastised by the Chief Engineer upon enquiring about his management and administrative duties. He was told he would be given verbal job orders daily, was to do only what he was told and would have no administrative duties beyond making log entries.
“In contrast, Section 2.4.2 of the FOPM (Fleet Operations Performance Manual) spells out significant duties for the second engineer – duties the Chief Engineer on the Bow Mariner was not prepared to entrust to his subordinate officers. This contrast between the content of the SQEMS (Safety, Quality and Environmental Management System) and actual practice on the Bow Mariner was pervasive”. (USCG 2005)

Further illustrations were given regarding the deck department, where the Chief Officer performed all management and administrative duties himself, without delegating or attempting to train the junior officers to perform any of these tasks. By doing this he would have reduced his own workload and provided for their professional growth.

“As a result the Filipino crew had little or no knowledge of the technical aspects of their job, so much so that they failed to question unsafe actions or procedures”.

The fear of the Greek officers, who threatened their junior Filipino counterparts with disciplinary action, also extended to the galley on the Bow Mariner. The attitude toward Filipino officer officers and crew was not limited to the Bow Mariner. As part of this investigation, the investigating officer visited a sister vessel.

“Several crew members made statements confirming the same cultural divide existed” aboard the sister ship. (USCG 2005)

So beyond the technical mistakes, which undoubtedly contributed to the disaster, it is clear that cultural issues and human factors in general also contributed significantly.

This paper advocates the analysis of how such issues can be addressed in a way that contributes to the prevention of incident.

3. EVIDENCE OF HUMAN FACTORS IN MANAGEMENT

It is not difficult to see how the culture of a shipboard environment can have an effect on an emergency. If the divide between various factions on board is so broad then it is clear when an emergency does occur an ‘every man for himself’ culture will prevail – just as it appears to have on the Bow Mariner, where the emergency was exacerbated by the fact that emergency drills were reportedly too rare to be of any value.

If factions are too far apart, they will think only of themselves and not even speak to one another in a common language. This again was evidence during the investigation on the Bow Mariner, when the senior staff spoke to each other in only their own native tongue rather than the agreed common language.

An even more preventable incident was reported in the Marine Accident Reporting Scheme (MARS) initiated by the Nautical Institute, number 200721. An attempted suicide was made by an apprentice who reportedly felt ‘alienated and victimised’, partly due to being of a different nationality to almost everyone else on board. A lack of counseling on board was suggested to be a contributory factor in his decision to attempt suicide. (MARS 2007)

The report drew a series of reflective observations;

“Seafarers may not be trained in psychology but many, with maturity, develop a ‘feel’ for detecting and ‘knack’ for dealing with personal problems among their colleagues. Given the enclosed working environment on board ship, senior officers and ratings should interact openly with younger colleagues and with trainees in particular, and play the role of friend, trainer and mentor. The master and senior officers should certainly show everyone that they are approachable, have a sympathetic ear and can come up with practical and acceptable solutions”.

“Gone are the days when the master of a ship could be unconcerned about the morale of the crew on board, when a kind word or deed was considered a sign of weakness. Now the maintenance of high morale is part of his responsibility and duty”.

“Times and attitudes change. Many seafarers reflect “I felt the same [as the attempted suicide victim] when I joined the sea but I coped with it and survived”. Some even feel that being tough with cadets is needed to make them ‘tough seafarers’ or ‘good officers’. We need to understand that times have changed, so have
people and in today’s world we may need to change our approach towards trainees. A more flexible approach and empathy to new cadets could go a long way in making them better seafarers in the long run.

“Interpersonal relationships between crew members should be closely and unobtrusively monitored by senior officers”.

“Cases of bullying, alienation and depression should be quickly detected and the grievances should be resolved fairly”.

“Cadets and new entrants to the seafaring profession must be given particular attention”.

“Special care should be taken by companies and manning agents to ensure that every recruit is physically and mentally fit”. (Seaways 2008)

“As senior officers, it is our responsibility to behave maturely rather than constantly saying ‘My way is best….. in my day….’. This is worth doing even if it means having to accept that we may not be as great seafarers as we think and that the way we were trained may not always have been the best”.

I even have my own incident to report. On only my second trip as an apprentice, I was sent forward to a fo’c’sle head space with a more experienced apprentice, to hunt for a piece of portable equipment. Upon opening the access to the space and finding the atmosphere expelled from the space to be of concern, and as a result showing reluctance to enter without suitable tests and precautions to be carried out, I was asked “Are you a man or a mouse?” . I believe that attitude no longer prevails, as inferred by the previous observers but it does indicate what has prevailed I the past.

Fortunately, there is an increasing amount of evidence in the trade press and anecdotal evidence from delegates attending my training courses that attitudes are improving.

The March 2007 edition of Seaways, the monthly Nautical Institute magazine, features an article referring to the International Labour Organisation (ILO) Maritime Labour Convention 2006 (MLC). The article declares; “Rarely have the interests of so many been drawn together in such an ambitious instrument of legislation”. (Peters and Cannon 2007)

It continues “The framework of the MLC provides a holistic view of seafarers’ welfare”. “Seafarers’ wellbeing is the primary focus of the convention. It puts seafarers at the heart of shipping, enabling and empowering them”.

Pink and fluffy, touchy feely it may sound but it’s nothing new and it does appear to follow in accordance with the inferences the incident reports, quoted earlier, have adopted. The emphasis on human factors rather than technicalities is noticeable. One might also cite the comparatively recent introduction of work and rest hours, being subject to legislation, as another human factor completely absent in the past.

The July 2007 copy of Seaways features another mechanism that has been accepted for centuries but not dealt with in the same manner as the article does, mentoring.

“Thinking back to your own days as a trainee or junior officer, you probably sailed with some people who were good teachers, gave you encouragement and guidance, let you try things out for yourself, congratulated you when you got things right, and encouraged and advised you on how to do better next time if things went a bit wrong. You probably also met people who took no interest in your training, did not explain things clearly, gave you very little chance to try things out for yourself and shouted at you when you made mistakes. Does that sound familiar?”. (Holder 2007)

The article continues to extol the benefits of a personal approach to mentoring, acknowledging the mistakes of the past perhaps. In fact, reading the quotation above echoes of the Bow Mariner incident report ring through those words.

4. LEARNING FROM MISTAKES
One could be forgiven for thinking otherwise but surely the most relevant function of incident reporting and investigation is to prevent a re-occurrence. The way the media represent incident reporting may exhibit a different motivation (Why shipping still has a great story to tell Lloyds List 5th November 2007). As has
been addressed in this paper already, evidence appears to suggest human factors are being taken into account more regularly. Why would such a technical publication as the International Code for the Construction and Equipment Carrying Dangerous Chemical in Bulk (IBC Code) include such references as cited earlier? Let us re-visit this publication to see how human factors have been included.

Whilst the points made in this inclusion are not necessarily revolutionary, they appear for the first time in this publication. In specific relation to a shipboard occupational health and safety programme, the phrases **executive management, commitment and leadership** and **employee participation** are mentioned.

Programmes are best, as they say, integrated into a management structure rather than treated as an “add on”. Included in its advice about policy statements it emphasizes how important it is that statements “convey how important each crew member is to the vessel as a fellow worker and as a company resource”. The advice goes on to define **stewardship responsibilities** and ensuring adequate resources of time, funds, training and the provision of expertise. Persons-in-charge are encouraged to ensure each crewmember receives an initial vessel orientation and to ensure competency by a pre-job explanation or walk-through of all procedures, before starting work.

“Full participation in developing, implementing, evaluating and continually improving [occupational health] helps those on board the vessel to see [the programme] as something that is the result of a value they share with vessel owners and operators. Personnel directly involved with the work are often the best source of information on health or safety hazards and can often suggest effective methods for abating those hazards”.

(IMO 2007)

In a similar way to the way the Maritime Labour Convention of 2006, detailed earlier, sought to empower seafarers, so does this inclusion of human factors mentioned in the IBC Code.

To be fair, the inclusion of human elements in guidance and legislation is not a particularly new development, however this paper is attempting to illustrate how the issue appears to have been taken at least one stage further.

Let us consider why the original Standards of Training Certification and Watchkeeping (STCW) legislation (of 1978) was overhauled in 1995.

“Flick through the pages of any of the leading industry magazines today and you will discover a wealth of technical innovation designed to make ships more efficient and safer. Everything from the propulsion systems, through the hull design to the navigation suite is the result of intense research and development activity.

The only exception to this rule is, ironically, the one key component on which everything else so often depends – the officers and crew.

It is widely quoted that 80 per cent of transport accidents are due to human error. It is the human element on board ship that can either provide the skills that may prevent a disaster, or the frailty or plain lack of competence that can cause one. And, while the capability, complexity and sheer power of technology seems to be accelerating exponentially, the human element remains a basic component with all its strengths and all its weaknesses. That is why the international maritime community has now evolved from an approach, which traditionally seeks technical solutions to safety-related problems and is focusing instead on the role of human factors in maritime safety.

The 1995 STCW Convention is one of several key initiatives that underpin this new philosophy at IMO. It seeks to establish a baseline standard for the training and education of seafarers throughout the world and, by placing an emphasis on quality control and competence-based training, it establishes a structure that can ensure not only that the required standard is met, but that it is seen to be met”. *(Excerpted from the IMO website)*. (MPT 2008)

The major difference we are starting to see in the industry now is that more emphasis is placed on engaging the learner, so this is where an analogy with education may be drawn. The MLC 2006 Convention mentions **empowerment** and the 2007 IBC Code infers this very strongly, as described above.
In 2000, the Inspector of Marine Accidents, Australian Transport Safety Bureau paper tells of a method of investigation incorporating an assessment of several human factors in the overall procedure of investigation. “In terms of marine accidents, we must not overlook the corporate environment and safety culture, the regulatory environment, the training environment and the design environment”. (Filor 2000)

5. HUMAN FACTORS APPARENT IN MARITIME EDUCATION AND TRAINING

So how does the aforementioned manifest itself in education and training and how does this new methodology distinguish itself from those utilised in the past? A number of different indicators are worth noting, ranging from the variety of ‘levels’ of education to the way in which the education is delivered.

For a start, it is becoming less unusual to find bachelor degrees being appended to traditional maritime qualifications. Amongst the reasons for initiating this change, from the traditional lower level qualifications (HND etc) was the attempt to attract youngsters into the industry, with the incentive of a globally recognised qualification. For a while the employers and educational institutions ‘sold’ the idea that upon qualification, an individual may wish to take up a managerial role in the shore-based side of the industry, if they didn’t like the idea of staying at sea.

I have observed that this selling technique disappeared promptly, as soon as it became clear that this approach was somewhat self-defeating. It was the lack of staff at sea that was a major problem in the industry in the first place. However, it is also acknowledged that the point may still be dangled in front of a school leaver, as demonstrated by the web site Courses and Careers; (2008)

“Seafaring experience and maritime skills are highly transferable and in great demand ashore in specialist jobs within the shipping and maritime sectors, and in a range of other industries”.

Nevertheless, there are no shortages of careers at sea and this can be evidenced by typing that very phrase into a web search engine.

However, there is a more subtle connection between educating apprentices to degree standards and the approach to acknowledging human factors in management techniques, as has been detailed hitherto. Learners in the industry would not expect to have inflicted upon them the same training methods that have prevailed in the past. Being talked (and shouted) at within the kind of training alluded to in the Seaways article cited earlier, involving mentoring, is not accepted as yielding suitably trained staff as it may have done in yesteryear. Learners / apprentices quite rightly expect to become engaged in the tasks, for which they are being trained. They don’t expect to be treated like school children and will often behave as such if they are. They rightly expect to be treated as a university student would, with some credibility, and to have their initiative recognised.

The same point is raised in the workplace. The International Maritime Human Element Bulletin January 2008 publication ‘Alert’ warns of the dangers of ‘dumbing down’, “If you treat me like an idiot, I’ll behave like an idiot”. The article goes on to offer advice with regard to industrial relations; “Find out what level of instruction / control crew are happy with and design the work and instructions to that level”. “Understand the capabilities and motivation of your crew”. (Nautical Institute 2008) “Collect feedback, especially after the introduction of new procedures”. The last point, leading on from the previous, infers inclusion and empowerment, which are associated thrusts of this paper.

The term engagement has appeared already in this paper. The term is implied in both the opening two incidents cited as examples of the lack of understanding of human factors. Individuals, or even groups of individuals, were not engaged in the process of the working environment. I’m certain all of us can remember lessons at school when the teacher seemed to go on and on, pre-occupied with their own self-importance and making no attempt to engage the learner.

The recognition of the importance of engaging the learner is becoming more prominent in maritime education. In his 2006 Seaways article Training the Teachers, Captain Richard Teo notes, “The teacher’s role itself has changed. There is a strong bind between knowledge, skills and competence and each teacher must be fully capable of handling these criteria. Theory must no longer be considered separate from practice, with different people employed to transfer the knowledge, skills and competencies. The teacher must be multi-skilled, with distinct leadership and team-building competence”. (Teo 2006)
It is perhaps this final sentence which has most impact. Leadership and team-building competences are undoubtedly more human factors than the technicalities associated with knowledge, skills and competence.

A statement later in the article opens up an entirely new debate;

“The teacher-centered approach may no longer be the best approach as adult learners are better educated today. Groups and individuals who sometimes have superior skills to teachers may provide strong synergy and group dynamics that aid the learning process, creating better learning environments and climates”.

Captain Teo then makes a very significant observation; “Learner-centered approaches combined with some teacher-centered approach are practiced in many places”.

But what exactly does Captain Teo mean by ‘learner-centered’ approaches.

The pedagogy section of Bath University’s web site compares and contrasts teacher and learner centered approaches, so it is worth referring to their pages.

6. TEACHER-CENTERED V LEARNER-CENTERED APPROACHES

A teacher-centered approach assumes the learners as empty vessels to be filled from the knowledge and control of the teacher. The teacher controls both the learning process (ie, lecture, demonstration) and the students’ access to information. Learning is viewed as an additive process and instruction is geared to the average student so all progress at the same rate. Brighter learners are held back and slower learners become lost.

Research into learning practices suggest that learners are not simply empty vessels, they each have their own perceptual framework, meaning they have both their own expectations and methods of learning. Indeed, all of us do learn in different ways, as Kolb cited in 1984 with his experiential learning cycle theory. “Learning is an active and dynamic process in which connections are constantly changing and their structure reformatted. Learners construct their own meaning by talking, listening, writing, reading and reflecting on content, ideas, issues and concerns”. (Kolb 1984)

Is there not a relationship between teacher-centered learners, as depicted by Bath University and the Filipino Junior Officers and crew aboard the Bow Mariner? Let us remind ourselves of a few observations made in the casualty report;

“the distinctions between the Greek senior officers and Filipino crew were remarkable”.

“Filipino officers did not take their meals in the officer’s mess, were given almost no responsibility and were closely supervised in every task”.

“The Chief Engineer was told he would be given verbal job orders daily, was to do only what he was told and would have no administrative duties beyond making log entries”.

The objective of comparing the two environments is that in both the training and practice of seafaring, learners are likely to contribute more to the achievement of the work if they are treated with some credibility. No one knows all there is to know about their work and all practitioners, both senior and junior, continue to learn. Greater emphasis perhaps is associated with the learning of junior staff but if we re-visit the definition of learner-centered education, the comparison with junior staff in industry is tangible. The inexperienced will grow in ability if educated appropriately. Consider on-the-job training, which is prominent in the maritime industry. The terms ‘training’ and ‘teaching’ may have different implications depending on the contexts in which the terms are used but the approach to either can be very similar. In fact, there is an argument to replace the term ‘teaching’ with the term ‘learning’ and perhaps this is what the observers quoted in this paper hitherto are subliminally espousing.

In order to discuss the matter further it will be necessary to introduce further academic terminology into the discourse.

Consider the terms ‘behaviourism’ and ‘constructivism’, which may not mean a great deal to all readers but once explained, may lead to at least a spark of recognition.
Though he perhaps did not realise it at the time, the celebrated Ivan Pavlov has been elected the founder of behaviourism. Most readers will be familiar with the tale of his dogs and it is the very meaning of these experiments which provide the rationale for behaviourism. To remind you of the story of Pavlov’s Dogs, he noticed how they salivated when presented with their regular lunch. Pavlov then decided to experiment by studiously providing his dogs their lunch at precisely the same time every day. After a while he accompanied the serving of food with the sound of a bell. Having established this pattern, he the simply sounded the bell without providing any food, yet he noticed the dogs still salivated. They seemed to associate the sound of the bell with anticipation of food appearing. Pavlov described the result of the experiment as conditioned reflex.

Teachers and trainers may find the idea of conditioned reflex quite appealing, when all they need to do to get a learner or trainee to complete a task, is to ring a bell or to give another some such simplistic signal. However, the trainer may like to reflect on what exactly they are producing by this methodology, nothing more than an automaton, who simply does what they are told. Echoes of the Bow Mariner report can be detected once again.

Yet if ships’ staff are to train the less experienced, the learners will have to be given the opportunity to gain a profound understanding of the work involved. Ultimately, these trainees may take over the positions of the experienced, which may not of course be an appealing prospect for some senior staff, lest they feel their own employment is in jeopardy. So what approach can lead to the kind of understanding required? Consider ‘constructivism’ as an appropriate approach. What do we mean by the term “constructivism”?

“Four epistemological assumptions are at the heart of what we refer to as "constructivist learning."

1. Knowledge is physically constructed by learners who are involved in active learning.

2. Knowledge is symbolically constructed by learners who are making their own representations of action;

3. Knowledge is socially constructed by learners who convey their meaning making to others;

4. Knowledge is theoretically constructed by learners who try to explain things they don’t completely understand”.

(Gagnon and Collay 1990)
An alternative view of learning incorporating constructivism is offered by Hein (1995) who combines two dimensions of learning theory and theory of knowledge in Figure 1 above. In this figure, the extreme ends of the knowledge continuum are related to how knowledge is developed, either by the learner or outside of the learner. The learning theory continuum is related to the process of learning, at one end incremental, separate and behaviourist type of learning and at the other, pure constructivism where each item of knowledge is related and compounded in order to form an ever increasing structure.

By merging the two dimensions, Hein identified four quadrants of learning, each contrasting with the others. One purpose of this paper is to espouse the benefits of constructivism, as represented in this figure.

Referring back to other examples in industry mentioned earlier in this paper, consider how far a behaviourist approach would deal with the human factors mentioned in the IBC Code? “Executive management commitment and leadership, employee participation and hazard anticipation, identification, evaluation and control, incident investigation and systematic programme evaluation and continuous improvement”. (IMO 2007)

How could a behaviourist cope with the attempted suicide featured in Marine Accident Report Scheme No. 200721? “Seafarers may not be trained in psychology but many, with maturity, develop a ‘feel’ for detecting and knack for dealing with personal problems among their colleagues”.

What did the Marine Labour Convention of 2006 declare?

“The framework of the MLC provides a holistic view of seafarers’ welfare”. “Seafarers’ wellbeing is the primary focus of the convention. It puts seafarers at the heart of shipping, enabling and empowering them”. (Peters and Canon 2007)
A behaviourist approach is unlikely to empower the seafarer as encouraged by the International Labour Organisation.

7. CONCLUSION
So, in conclusion, my belief is that not only do we see evidence of a more constructivist approach being adopted in certain areas of the maritime industry but we should further encourage the style. Both maritime education and practitioners within the industry itself can benefit.

How does this constructivist approach transfer from the classroom to the workplace? Well, consider how one might co-ordinate a case study in a classroom. Individual learners are given a set of facts, say from an accident report, then it is up to them to construct a series of related sequence of events which led to the final outcome, an explosion on a tanker, for example. The individual students / pupils / learners are credited with enough knowledge to be able to knit the series of events together to lead to a conclusion.

Within an industrial setting, the individual learner / trainee will have a clear understanding of the objective of an operation; launching a lifeboat, entering a dangerous space, conducting a mooring operation, as examples. Whilst they may be used to simply acting on a command (a behaviourist approach), their learning experience will be enhanced with an understanding of how each task contributes to the achievement of the overall objective. Whilst each single action requires co-ordination, the overall objective is more likely to be achieved more efficiently if each component contributor recognises how their actions accumulate sequentially. The three examples of routine ship board operations quoted earlier in this paragraph all require teamwork. Every team will achieve their objective if each member of that team knows exactly what is expected of them and what is expected of each other. Tasks are not duplicated unnecessarily and because each member can see the overall objective, they work together to achieve the objective. It sounds easy and straightforward but we all know how often such a simple aim can be missed. One frequent cause of such failure is that members of the same team work against each other because they do not understand either their own function or that of their team mates. Perhaps it is because they have trained on a behaviourist approach, ‘only do what you have been told’ – where have we seen that before in this paper? The Bow Mariner report, again.

Perhaps without realising it, the organisations noted have subliminally adopted a constructivist approach and are beginning to reap the benefits of their decision, whether conscious or not. Learners as well as staff will benefit, since the constructivist approach, by definition, empowers the learner.

8. REFERENCES


