Establishing the underpinning theories of maritime education and training for on-board competencies

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Abstract: This paper develops on the report of an executive interaction on maritime education and training (MET) that was undertaken at the World Shipping Forum, an international conference hosted by the Chennai branch of Institute of Marine Engineers of India. Employing an inductive approach it delves deep into academic literature to establish a theoretical frame of reference to evaluate the administration and delivery of MET as debated and concluded at the conference. The originality and value addition of this paper lies in establishing a theoretical context for the longstanding practices as well as emerging trends in the conduct of MET.

Keywords: *Maritime education and training (MET), theoretical framework, theory and practice, scientific development*

Introduction

The World Shipping Forum (WSF) is an international level event of the Institute of Marine Engineers, Chennai Branch, India. The WSF 2013 in its inaugural plenary session critically reviewed Maritime Education and Training in India in all its facets, and its role in delivering competent seafarers. In preparation for the event the organisers engaged with MET stakeholders and arrived at six prominent areas of concern with regard to the current status and future direction of MET in India. These were then deliberated upon at a half day executive interaction amongst select key panellists from India and overseas, and the larger audience at the WSF 2013. The first author played a key role in this entire process, from its preparations, which began six months in advance of the event, to its conduct, post-event analysis, synthesis, and finally reporting. While the deliberations were noted to be founded on experience and general awareness from a practitioner's perspective and hence were largely logical, relevant and incisive, the lack of awareness of underpinning theories to established and evolving practices was unsettling and cause for concern. It is time that MET institutions augment experience with theory and are informed by research findings.

Most rational decisions are based on some form of theory. Theory provides the fundamental basis for deeper understanding of a subject. It helps in building generalised models applicable to a range of situations. It further provides a conceptual framework and gives a perspective for the practical study of a subject. Theory not only enables better understanding but also helps guide development and evaluation of implementation and mechanism of action. Thus theory and practice are inseparable. Together they lead to a better understanding of factors influencing patterns of behaviour in organisations and application of the process of management (Billbsberry, 1996). This lack of adequate scientific approach is not confined to MET but is found to be endemic in all aspects of shipping industry operations. Research findings of the first author on 'challenges and potential of technology integration in modern ship management practices' revealed this to be one of the major underlying causal factors that contributed to delivering un-optimised technology integration, and hence all its resultant and associated challenges (Bhardwaj, 2013 a). Sharma (2008), in his study of the understanding of a service management framework in the ship management industry, finds that it primarily runs on heuristics and thumb rules. He opines that as the industry has some very unique occupations set in a relatively isolated environment, it tends to believe that it is managing well by itself and does not any external interventions. In spite of being a capital intensive industry, some basic management models and scientific underpinning are found to be conspicuous by their absence.

The remainder of the article discusses theories that underpin the six broad areas of concern in MET that were deliberated upon at the forum: 1. The learning paradigm, 2. Sea time training, 3. Technology in MET, 4. The Skilling conundrum, 5. Attitude as a necessary component of competency, and 6. Regulating MET.. An understanding of the underpinning theory is envisioned to provide a starting point for a comprehensive action plan for course correction on MET as envisaged by the forum and all its stakeholders.

1. The learning paradigm

Over the past several decades, learning theory has undergone a major paradigm shift toward a more student-centred approach. Despite the building evidence in support of learner-centred teaching, many Maritime Institutions cling to the traditional style of pedagogy wherein knowledge is passed from all-knowing expert to passive novice, most often through formal classroom teaching.

Since the way we define and think about learning has a significant impact on the decisions we make in all aspects of instruction, it behoves maritime educators to have a sound understanding of the philosophy, theory and epistemology underpinning current educational practices. Tam (2000) states that, "…effective [instructional] design is possible only if the developer has developed reflexive awareness of the theoretical basis underlying the design." In this regard, it is useful to examine how the most influential learning approaches of the last century, objectivism and constructivism, have shaped assumptions about the roles of teacher and learner, and influenced instructional design and strategy.

Traditional classroom learning is based on behaviourist and cognitive information-processing approaches, which are both objectivist in nature. The objectivist model views knowledge as an absolute reflection of reality, existing independently of the learner. As such, the goal of instruction is to model that external reality for the learner, so that knowledge can be transmitted and internalized. The role of the instructor is to analyse the subject-matter in order to determine what reality should be learned and then break the knowledge down into simplified parts to be built into a complex whole (Jonassen, 1991). The goal of the learner is to assimilate the knowledge and correctly mirror the content and structure in their thinking (Jonassen, 1991). Learning is manifested as a change in the learner's behaviour or cognitive structures. Since the underlying assumption of objectivism is that reality is externally mediated, and thus can be assimilated by all learners through essentially the same process, the student of objectivist based instruction is not expected to interpret, question or create knowledge, but to receive it passively from the teacher.

This teacher-centred approach has a long history in instructional design. Models of instructional design that are based on the assumptions of objectivism follow a common approach wherein each step in the pedagogical process is analyzed, decided, designed, delivered and evaluated by the instructor, with minimal input from the learner. Instructors analyze the learning conditions including the content, tasks and learner characteristics to determine what specific knowledge should be taught to the learner. The selected content is then decomposed into manageable units or modules for ease and efficiency of learning and component tasks that are the expected outcomes of learning are identified, prioritized and sequenced (Ertmer & Newby, 1993). Based on the content/task analysis, learning objectives are formulated, indicating what specific knowledge the learner will acquire by the end of the instruction period. Evaluation consists of determining whether specific learning objectives have been met with emphasis placed on identifying observable changes in the behaviour and cognitive structures of learners (Vrasidas, 2000). There is necessarily a strong alignment between learning objectives, instructional activities and evaluation.

Willis (1995) summarized eight characteristics of the Objectivist-Rational Instructional Design model:

1. The process is sequential and linear
2. Planning is top down and systematic
3. Objectives guide development
4. Experts are critical to instructional design
5. Careful sequencing and the teaching of sub-skills are important
6. The goal is the delivery of pre-selected knowledge
7. Summative evaluation is critical
8. Objective data are critical

The objectivist approach has had a tremendous influence on teaching and learning and is still firmly entrenched in teaching and instructional design practice. However, many educators have questioned the assumptions of the objectivist model and the effectiveness of the traditional teacher and textbook guided classroom. A primary criticism is that the traditional approach is teaching rather than learning focussed and separates theory from practice, Emad and Oxford (2008) criticized the approach as used in MET institutions, arguing that it "presupposes that only by knowing the theory of a task we would be able to do it, that we can teach a task by breaking it into sub-tasks and teaching each one separately, out of context." As a result, a new paradigm has emerged over the last two decades toward a constructivist approach. While constructivism has not replaced the traditional learning model, it has made a significant impact on the epistemology of learning and has wide ranging implications on instructional design and teaching methodology.

Contrary to objectivism, constructivism is based on the fundamental epistemological assumption that knowledge is something constructed by the learner rather than existing independently of the learner. Learners construct meaning based on their prior experience, knowledge and beliefs about the world. As such, new information can only be interpreted in the context of the learner's own experience and what the learner already knows (Jonassen, 1991). When confronted with new information, the learner measures it up against prior concepts and, through reflection, engages in a process of cognitive restructuring to build on, reorganize or replace existing models of understanding (Perkins, 1991).As this process occurs at increasingly sophisticated levels, the learner's cognitive and meta-cognitive abilities are enhanced and the novice moves toward thinking as an expert in the domain. Correspondingly, constructivist educators are interested in supporting learners' active reflection on new concepts rather than their ability to memorize pre-packaged information.

Constructivism has historical roots in the viewpoints of a number of prominent psychologists and philosophers including Piaget, Blumer, Vygotsky and von Glaserfeld, while in education, constructivism has come to be viewed as a learning theory rather than an instructional design-theory. It makes assumptions about learning which in turn suggest new instructional principles. The key principles from the constructivist perspective that have direct relevance for the design of learning environments are: 1. Learners construct their own knowledge and understanding. 2. Knowledge and skills are inextricably linked to the context in which they are learned. 3. Learning follows from the need to complete complex authentic tasks and solve problems. 4. The role of social interaction is critical to learning (Driscoll, 2007; Ertmer & Newby, 1993). These principles provide theoretical bases for a number of learner-centred approaches that have their roots in constructivism, including situated cognition, cognitive apprenticeship, problem-based learning and collaborative learning.

The essential idea that knowledge is entrenched in and inextricably connected to the context in which learning occurs, has bearing on the goal of instruction. If, as Lave and Wenger (1991) assert, knowledge and thinking are bound to the "immediate social and physical context of the learning experience", then the authenticity of the learning experience is vital to

the learner's ability to apply the knowledge. The obvious pedagogical implication is that learning must not be de-contextualized, but should take place, as much as possible, in the authentic, real-world environments where learners will eventually be expected to demonstrate competence in the skills and knowledge learned (Jonassen, 1991). Situated learning and apprenticeship training are models that emphasize the acquisition and practice of skills and knowledge in their real-world social and functional contexts. Apprenticeship training allows learners to work in the field under the supervision and coaching of experts, where they gradually move toward competency and independent exercise of a variety of skills. At the same time, the apprentice is enculturated into a community of practice, learning the norms and behaviours of the profession (Tam, 2000).

In the constructivist view, opportunities for authentic learning and the concept of apprenticeship can be applied to the classroom situation if learning is anchored in meaningful contexts. Whereas traditional learning environments adopt a bottom-up approach where the context is broken down into component parts, and isolated skills are taught separately, the constructivist instructor assumes a top-down approach. Rather than arranging discrete elements of a topic to be learned, the instructor creates an environment where learners are confronted with realistically complex tasks and problems that require them to apply and test their knowledge. The problem or task creates the context and learning occurs through the active construction of knowledge and skills required to solve the problem or complete the task (Collins, Brown & Newman, 1989). The cognitive apprenticeship model is grounded in this constructivist epistemology wherein, analogous to traditional apprenticeship, it applies the apprenticeship model to the cognitive domain. Learning occurs through the interaction between experts (teachers) and novices (learners) while focused on completing a task. Teachers set tasks that are within the learners' zone of proximal development (Vgotsky, 1978); that is, tasks that cannot be completed without assistance. Teachers then provide scaffolding through modelling of externalized cognitive processes to help learners complete the task and eventually master the process themselves. In this way, the learner acquires not only content knowledge, but develops the problem solving skills used by experts in the content area.

The problematic situation is a key component of constructivist pedagogy since it allows learners to apply and test their existing knowledge while constructing and refining their understanding of new concepts. The idea that learners actively construct their own knowledge suggests that learners' personal understandings may differ somewhat with those of their peers or teachers (Driscoll, 2007). As such, learners continuously test their own interpretations against those of others to determine the validity of their ideas, negotiate meaning and develop shared understandings. Collaboration among learners and between learners and teachers is, therefore, central to building constructivist learning environments. Social interaction plays a critical role in the learning process as it allows learners to recognize, compare and evaluate different perspectives on an issue, and combine their knowledge toward the solution of a problem. The role of the teacher is to construct and maintain a collaborative learning environment where authentic, relevant contexts can be experienced. Rather than seeking to transfer intact knowledge to the learner, the teacher acts

as a facilitator or guide, encouraging students to reflect on their evolving knowledge, resolve misconceptions, and construct new models of understanding. The focus is on the cooperative construction of knowledge and real world problem-solving skills rather than on the passive reception of pre-selected and pre-packaged content.

MET educators will find parallels between constructivist ideology and the principles of competence-based education (CBE), as framed in the IMO's STCW Convention. Wesselink, Biemans, Mulder, and Van den Elsen (2007) define the conceptual framework of CBE as consisting of eight principles; constructivist implications are listed in brackets:

1. The competencies that are the basis for the study program are defined

2. Professional core problems are the organising unit for (re)designing the curriculum (learning and assessment) [Present authentic tasks; Provide real-world, case-based learning environments (Jonassen, 1991]

3. Competence development of students is assessed before, during and after the learning process.

4. Learning activities take place in various authentic situations [Provide for authentic versus academic contexts for learning (Wilson and Cole, 1991); Embedded learning in realistic and relevant contexts (Honebein, 1996)]

5. In learning and assessment processes, knowledge, skills and attitudes are integrated [Create learning environments where knowledge, skills and complexity naturally exist (Tam, 2000)]

6. Self-responsibility and self-reflection of students are stimulated [Foster reflective practice (Jonassen, 1994); Encourage self-awareness in the knowledge construction process (Honebein, 1996, p.11); provide for learner control (Wilson and Cole, 1991); Encourage student autonomy and initiative (Brooks and Brooks, 1993)]

7. Teachers, both in school and practice, balance their roles as coaches and experts [Teachers serve as models and guides, promoting scaffolding and coaching of knowledge, heuristics and strategies (Collins, Brown and Newman, 1989); Teachers provide scaffolding or act as facilitators of learning (Tam, 2000)]

8. A basis is established for a lifelong learning attitude among students [Encourage ownership and voice in the learning process (Honebein, 1996); Engender a shared commitment to learning (Brown, 1994)].

Only when the average scores on the extent of realisation of nearly all principles are relatively high can a particular educational program be characterised as a comprehensive

CBE. Thus the implementation of CBE has consequences for all aspects of teaching and learning processes in educational practice.

Constructivism presents an alternative view to the traditional pedagogy found in many maritime institutions, but should not be considered a panacea. There can be no single best approach to learning since each learning situation is different and is influenced by any number of variables including learners' prior knowledge and the requirements of the task to be learned (Ertmer & Newby, 1993). To achieve optimal learning outcomes, both the learners and the task must be carefully evaluated, and the instructional approach chosen based on the relevant factors. Jonassen (1993) has described a continuum of knowledge acquisition comprised of three phases: introductory, advanced and expert. He asserts that introductory learning is best served by objectivist approaches since learners have very little prior knowledge in the content area and require more structured guidance. Constructivist learning environments, on the other hand, are more effective in the second phase where learners acquire more advanced knowledge in order to solve complex problems.

Since learning in MET institutions typically lends itself to both objectivist and constructivist learning approaches, a blended approach is often required. The fundamental first step to evaluating and effecting change in MET programs is for those in charge of instructional design and delivery to reflect upon and articulate their ideas about knowledge and learning and to adjust their approach accordingly.

2. Sea time Training

Dedicated sea time training has been a part of the finest traditions of merchant marine education and training and has thankfully not been compromised excessively though rumblings have been noticed on inadequacies of minimums mandated in STCW. The lack of opportunity for Indian seafarers in training to fulfil this important criterion was noted to be a cause for concern and, as such, one of the most important outcomes of the WSF conference was a viable proposition for a trading-training ship. It is recognized that access to knowledge that is situated in the authentic activities of a community of practice (Lave and Wenger, 1991) through onboard training is more than an STCW mandate, it is essential for learning.

Many traditional classroom learning activities can be seen as fixed, abstract and out of context, imbued with the assumption that knowing is separate from doing. This dissociation is artificial and particularly problematic in a field where emphasis must be focussed on what learners are able to do rather than what they know. While doing can presuppose knowing, knowing does not necessarily translate to competence in doing. Indeed, Brown, Collins and Duguid (1989) analogized conceptual knowledge to a set of tools. They reasoned that it was quite possible to be in possession of a set of tools without knowing how to use them. Similarly, learners can assimilate abstract concepts, rules and procedures in the academic context without knowing how to use them in practice. Such knowledge remains embedded in the academic context and is essentially inert. In contrast to abstract classroom activities, on-board training in the situated apprenticeship model supports the development of skills and

knowledge in the real-life context in which they are intended to be used. The apprentice, in onboard training, uses the tools (both literal and figurative) of the profession, building an understanding not only of the tools themselves but of the community and culture in which they are used. From the viewpoint of situated learning (Lave and Wenger, 1991), learning is a "function of the activity, context and culture in which it occurs."

For social constructivists, the construction of meaning is grounded in group social interaction, and, as such, learning that focuses wholly on individual construction of knowledge and ignores the social context is seen to be inadequate. The rich social environment embedded in the concept of situated learning in communities of practice underpins the well-established practice of sea time training for merchant mariners. Through onboard experience learners become engaged in a community of practice that embodies the norms and behaviours of the profession to which they aspire. In this view, social interaction is critical to the learning process. Lave and Wenger (1991) coined the term "Legitimate Peripheral Participation" to refer to the process by which novices become integrated into a community. Newcomers join the community and learn at the periphery, performing tasks that may be less critical to the community. As they become increasingly competent through interaction, engagement and shared practice with members of the group they move toward full participation in the community, or from apprenticeship to expertise (Lave and Wenger, 1991). Participation as members of a community of practice shapes newcomers' identities and in the process gives structure and meaning to the knowledge and skills acquired.

Building on the theory of situated learning, cognitive apprenticeship is a learning model that provides instruction in authentic situated contexts. Cognitive apprenticeship aims to teach novices the processes that experts use to manage complex tasks and solve problems within the knowledge domain (Collins, Brown & Newman, 1989). Novices learn through guided experiences wherein experts articulate their thought processes as they work through a task or problem. This enables learners to compare and adjust their own heuristic and control strategies with those of experts and other novices, eventually arriving at a cognitive model of expertise (Collins, Brown & Newman, 1989). Sea time training provides an opportunity for novice seafarers to benefit from both traditional and cognitive apprenticeship models.

Competence based education (CBE), which underpins seafaring, implies and demands the creation of opportunities for students in meaningful learning environments in which they can develop integrated, performance-oriented capabilities for handling professional core problems in practice. In this regard the connectivity between learning in school and learning in the workplace, in a professional practice setting is crucial. However, authentic learning environments need not be the exclusive domain of sea time training. Learning approaches based on constructivist elements of the apprenticeship model can transform traditional classrooms into contextualized problem-solving environments that foster collaboration and participation in communities of practice. Technology supported learning environments are highly compatible with these constructivist principles.

3. Technology in MET

With regard to integrating educational technologies into MET in India, the conference noted that the field was lagging behind compared to advancements made in other streams. This was partially attributed to the somewhat understandable reluctance of practitioners who feel unprepared for the implications of moves toward technology-based training. In spite of this view, the practical advantages concerning cost reduction and flexibility of access as well as those from a pedagogical perspective were well acknowledged. Technological tools, such as e-learning and simulator technology, if integrated judiciously and based on proven learning theories, were agreed to be effective supplements for the face-to-face teaching-learning environment. Indeed, a carefully considered application of learning technology could address some of the criticisms regarding traditional or objectivist teaching methodologies and establish a sound foundation for a blended approach to instruction.

In the traditional classroom, a single set of curriculum is commonly taught at the same pace and sequence to all learners with little consideration of differences in learners' prior knowledge or learning style. A significant implication of e-learning at the introductory stages of knowledge acquisition (Jonassen, 1993) is that it has the potential to accommodate these differences among learners, allowing learners to set their own pace, and delve deeper into challenging topics. With web-based instruction, content does not have to be viewed in a pre-arranged sequence. Learners have the opportunity to organize information in a more personally meaningful way. Online learning can also cater for differences in learning styles (Kolb, 1984) by presenting information in a variety of ways through hypermedia, and including tasks and activities that appeal to different learning styles. Learners in the early stages of knowledge acquisition can, to some extent, customize and control their learning experience, within a monitored and structured or semi-structured learning environment. This aligns with the constructivist perspective, which rejects the concept of the "average" learner (Bednar, Cunningham, Duffy & Perry, 1992) and empowers learners to make choices about how they learn.

Contrary to the traditional teacher-centred approach, modern technologies, which are social in nature, can enhance the learning experience by creating opportunities for collaborative, problem or case-based learning environments. Synchronous and asynchronous technologies such as shared documents, chats, wikis, blogs, instant messaging and voice over IPs facilitate communication and shared knowledge construction among learners. Shared experience in a learning community allows learners to articulate, negotiate and measure their understandings against those of others in the group (Tam, 2000), including those outside of their zone of proximal development (Vygotsky, 1978). This process is key not only to the construction of knowledge, but to the development of the interpersonal and critical thinking skills expected of competent maritime professionals.

Simulation technology provides rich opportunities for learning within the cognitive apprenticeship mode. Simulations are particularly valuable in allowing learners to develop

cognitive and learning strategies in an environment that closely models the complexities of the authentic maritime domain. As Gredler (2004) notes "the power of simulations is that they offer opportunities for learners to control and manipulate a wide range of interrelated variables within a complex system in order to better understand how specific actions can impact outcomes" (as cited in Seo, Byk and Collins, 2011).Learners can benefit from opportunities to experiment with different strategies in a range of scenarios, and subsequently review and analyse their own performance (Wilson, Jonassen & Cole, 1993). At the same time, simulation technology allows for failure in a safe environment. Learners can reflect on their errors and use them as a basis for self-correction, exploration and cognitive model building, without imposing physical or financial risks on themselves or the environment (Seo et al, 2011).

While instructional technologies put learners at the centre of their own learning process, the role of the instructor is not insignificant. To effectively engage cognitive processes in the learner, the instructor, as in traditional apprenticeships, is required to act a mentor and facilitator. Setting and scaffolding increasingly complex tasks and scenarios, the instructor encourages learners to articulate their decision making processes, reflect on their actions and learn from their errors (Wilson et al, 1993). The ultimate goal is to help learners develop cognitive models of expertise so that they become flexible problem solvers in the work place.

Simulated environments are an effective source for formative and summative CBE assessments, which require students to demonstrate that they are competent in dealing with a particular critical job situation and dealing with professional dilemmas. Care has to be taken to see that there is absolute alignment between school assignments, workplace training and competence based assessments.

4. The skilling conundrum

The forum debated the well founded dichotomy on whether the industry needed to deskill its human resources in light of capable and enabling technology and tackle human error with reliance on technology or whether it needed to up-skill its people to handle the complex technology.

For a thorough understanding of human cognitive behaviour in system operation, it is imperative to advance the fundamentals of human factors engineering and human – machine interface, particularly in high risk industries like shipping (Bhardwaj 2013 b). The human factors engineering concept is about the comprehensive integration of human characteristics into the definition, design, development, and evaluation of the ship to optimise human/machine performance under specified conditions. This concept of human factors engineering is as an essential component to meet the challenges of automation (Perrow 1983).

The qualitative model developed by Rasmussen (1983) describes the behavioural structure of humans when working with control systems. He suggests that people perceive information (visual perception), then remember what is needed to carry out the task (memory), and then make decisions. The key elements of decision making are the skill–rule– knowledge (SRK) model of human decision making, as shown in Table 1:

SBB	Skill based behaviour is a nearly automatic response of operator handling well known situations. This produces best performance in terms of speed, accuracy and error rate.
RBB	Rule based behaviour, where the operator follows a reasonably well known process and procedures. Performance is usually good although not as fluid as SBB.
KBB	Knowledge based behaviour, where operator must resort to his or her fundamental knowledge of the process to solve a problem. This is slowest and error prone, normally used in novel tasks, or abnormal / emergency situations.

Table 1: SRK Model of human decision making. *Source: Rasmussen, (1983).*

In novel cases, operators over time pass on to RBB and then SBB, hence the idea to train operators in these two types of behaviours. Typically, decision making includes identifying known successful recipes that correspond most closely to the present situation, adapting the best matching recipe, simulating it mentally, and then implementing it. That is where simulator training helps. Only when there is no existing recipe that one goes through KBB, with its associated difficulties and potential errors, but it is the only resort in novel tasks or abnormal and emergency situations which is more a norm than exception in the shipping environment. Rasmussen's model is generally well accepted in human factors literature as it offers a good breakdown of cognitive functions and their interrelations, as in the Fig. 2.

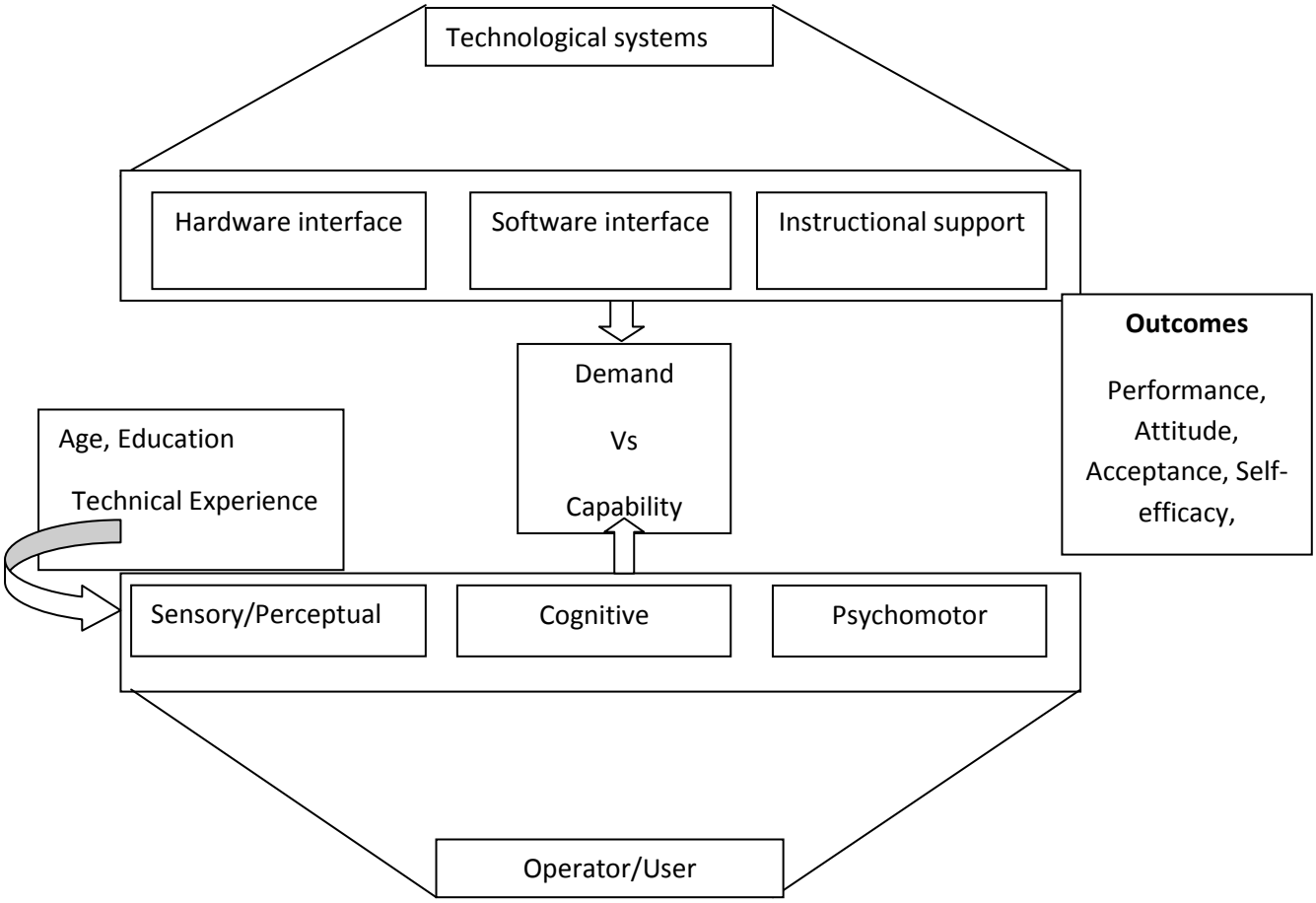

Figure2: Example of human – machine system. *Source: Rasmussen, (1983).*

An acknowledged pitfall in competency based education (CBE) one needs to bear in mind is the rigid backward mapping from job requirement to learning trajectories. This often leads to conservative training instead of preparing students for innovative developments and being appropriate to a Taylorist world but inadequate in preparation for highly-skilled workplace where flexibility and problem solving abilities are required (Biemans et al., 2009).

5. Attitude, a necessary component of competency

The forum affirmed that seafaring competency comprised a rich mix of knowledge, skills and attitude. It was noted that while the knowledge agenda seemed to be served well, it was the skills and most definitely the attitude aspects were found lacking and that needed to be addressed.

Attitudes influence willingness to apply skills and knowledge, and the underpinning theory is the 'Theory of Reasoned Action' (TRA) (Fishbein and Ajzen, 1975). TRA posits that individual behaviour is driven by behavioural intentions. These intentions are a function of attitude (positive or negative feeling about performing a behaviour) and the subjective norms

surrounding the performance of the behaviour (See figure 1). Attitude can be determined through an assessment of one's beliefs regarding the consequences arising from a behaviour and an evaluation of desirability of these consequences. Subjective norm is defined as an individual's perception of whether people important to the individual think the behaviour should be performed. The contribution of the referent is weighed by the motivation to comply.

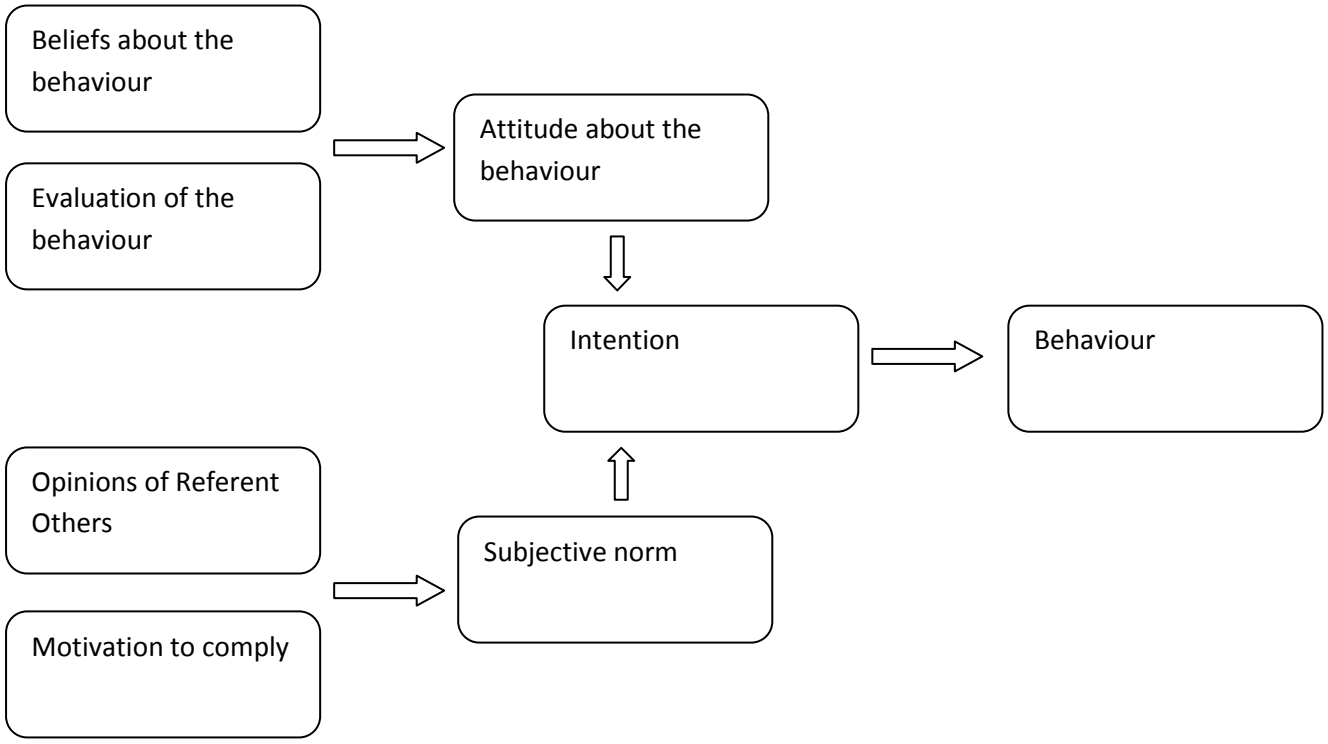

Figure 1: Theory of Reasoned Action. *Source: Fishbein and Ajzen, 1975.*

The institutes thus play an important role in attitude building by understanding that attitude is very closely connected to motivation. Educational psychology proclaims that motivation has several impacting factors on how students learn and how they behave towards subject matter. Principles of adult learning such as relevance and self-direction reinforce that they need to find meaning and practicality in the instruction or the topic. They need to want to learn it/do it and to have the confidence in themselves that they will be able to meet the training objectives.

Brockmann et al., (2008) examined the notion of competence in vocational education and training systems of France and England and found a key distinction between a knowledge based model in France and skills-based model in England. They suggest that competence in France is multi-dimensional and relies on integration of practical and theoretical knowledge

as well as personal and social qualities of attitudes and attributes within defined occupational field. By contrast, in England, competence refers to the performance of fragmented and narrowly defined tasks with minimal underpinning knowledge denoting functional employability for low-skilled employment. Biemans et al., (2009) applaud the fact that CBE and its assessment take the attitude aspect of competence much more into account e.g. taking initiative, willingness to learn, being a sociable co-worker, and claim that employers consider these attitudes to be crucial in professional practice. They need to be well articulated in critical job situations exercises and its assessments.

6. Regulating the MET

Traditional command-and-control regulations rest on the tacit assumption that government regulations are the only source of accountability. Today's strict and overly regulatory compliance approach in managing MET was seen to have many pitfalls and the need for more imaginative ways of governance and administration of MET are called for.

The moot question remains as to when and how do external legal regulation influence behaviour? A legal rule is an instrument in the hands of a policy-maker. The question of legal effectiveness refers to roughly the same means-end relationship to the user's objectives as in the case of any other tool, and it is a matter of correlation between rule and intended behaviour. Non-compliances are for deviant situation of ineffectiveness. This instrumentalist paradigm has not only proven sterile in practice, it is also on theoretical grounds untenable. Command and control is presumed to adjust individual behaviour. The objection is (a) society is seen as individuals bound together by the policy-maker and not anything else. The law addresses to individuals and concerns itself to individual behaviour. (b) There is assumption of normative monopoly and ignores other sources of regulation as important influence on behaviour. The real social state of affairs is overlooked and social space between the regulator and the regulated is conceived as a normative vacuum. This is contrary to basic social theory of man having a fundamental social character and that the social reality is one of legal pluralism (Griffiths, 1991).

The theory of social working of law approaches legislation not top-down as in the case with instrumentalism, but bottom-up. It is then, not the intention of legislator but social life that is at centre stage. What question the social working of law addresses is: What precisely are the behavioural consequences of such regulatory efforts and how exactly do they come about? Legisprudence, which is defined as rational theory of legislation premises that social practices are presumed to be self-regulating with rules embedded in social practice. Education most certainly is one such practice (Wintgens, 2006). A voluntary approach thus makes governmental approach non-coercive and key policy instruments are exhortation and various forms of assistance. Rather than mandating government promulgates guidelines for best practices and encourages adherence to them.

However, consideration of organisation's motivations to act is important for understanding the viability of two approaches. The notion that institutions will voluntarily undertake actions is contrary to the image of profit-making that ignore the external impacts, although presumably educational institutions are not-for-profit. But experience with diverse set of voluntary programs show some are motivated to act out of combination of civil duty, good public relations, market differentiation and fear of stringent government regulation (Segerson and Miceli, 1998). At the same time related research also demonstrated limitations to such voluntary programs which could not expand beyond core group of committed entities (King and Lennox, 2000). Taken together, it suggests that voluntary programs have promise, but they may not be a panacea. If entities are motivated by a sense of duty and concerned about potential harms, the voluntary approach has promise. If these motivations are lacking, more coercive approaches may be necessary. Therefore regulation and motivations go hand in hand. Thus mandatory and voluntary approaches are best viewed as two ends of a continuum rather than as a sole choice. Deviants may be pushed towards traditional regulation along the continuum and it will hold the threat if harm not sufficiently addressed (May, 2005). Fostering deterrence need not entail an elaborate enforcement regime as individual facilities' sense of duty can be addressed by collective sense of a need for action and professional bodies can play an important role in shaping peer reputation which serve as important contributors to this motivation. Although the whole point of IMO approved competency profiles in CBE stipulated through STCW is their exchange value in the labour market, it is important for schools to remain tuned to specific context of their student community and ethnography. This requires a balance between standards and local flexibility.

Conclusion

It is imperative that those connected with education and training in the maritime domain have a sound understanding of the fundamentals underpinning competence based education to enable take informed policy decisions. Indeed such a culture needs to permeate to all aspects of operations in the domain that is seen to rely on heuristics and thumb rules. The pitfalls for MET in the light of issues discussed are over-reliance on standardization emanating from strictly regulating the MET and rendering it conservative and differing perceptions by various stakeholders. While there is merit in internationally defined competency profiles for its exchange value in the labour markets, it is important for countries to stay tuned to the specific labour context and culture and find an appropriate balance with the underpinning theories to develop and base MET on. There is need to also take into account of recent and future developments, innovations and dilemmas in professional practice and be proactive. So also the fact remains that spending a portion of time at the workplace does not automatically denote educational enrichment; structured training in a training ship environment that provides continuity in the learning pathway as suggested in the symposium would enhance workplace learning. Thus a rich mix of formal and informal learning and assessment, guided learning and self-directed experiential learning firmly anchored on scientific underpinning will deliver MET comprehensively and consistently.

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