

Crew Training – where do we go now?

*Paper given at ECDIS Revolution Conference in London by
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Background

As an ECDIS manufacturer I have been involved with every aspect of ECDIS from development and type approval to sales, training and support.

The first thing I would say is that it is of paramount importance to get training right because it directly influences the effectiveness with which manufacturers' equipment is used and the burden placed on the support line. To date, it is clear that many of PC Maritime's users have not been on a Generic ECDIS course. This is evidenced by the level of confidence displayed by our users and the type of questions we get; for example, we are sometimes told that ENC's are incomplete, or that the ECDIS must be wrong, because "it is missing data" such as in dredged areas or where soundings have not been turned on.

In this paper I am primarily talking about type-specific training; the principles of ECDIS are covered by the generic course. Type-specific training provides awareness of the functions present in the software, and the "How To Do". How do I install charts, update them, plan a route, and monitor position, on a specific ECDIS?

I have attended quite a few ships to deliver familiarisation or type specific training. Usually this is for a day to train the watch keeping officers. In practice everyone is trying to fit training around other duties. The Master is invariably called away; the Chief Officer is always busy. If we're lucky everybody gets an overview and the second mate gets a reasonable run through on passage planning. And then, quite often, the second mate will say, "I'm away on leave tomorrow – I'll try to pass on what you've told me to the new second mate". This gives rise to "trickle down training" which is regarded as unsatisfactory.

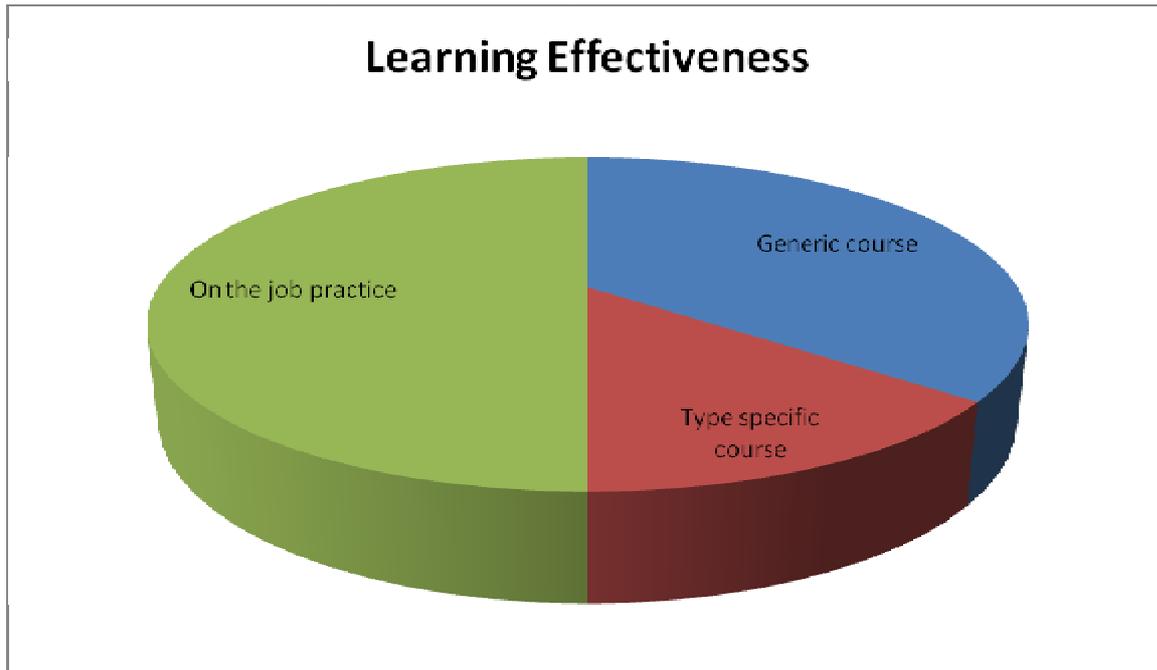
PC Maritime also provide face-to-face training ashore, usually at a customer's offices. This has its strengths: no interruptions, time to cover the material; and its limitations: information overload (by mid-afternoon), skill fade (it may be weeks or months before the attendees use the equipment).

Face-to-face training carries costs that must be justifiable. There's the cost of the trainer, travel and subsistence; the logistical problem of getting people together in one place and the fact that many seafarers have to undertake training in their own time, unpaid. Some estimate logistical costs to be as much as 75% of the whole.ⁱ

Effectiveness

Studies have shown that a primary cause of training failure occurs when trainees do not use what they have learned soon afterwards. As much as 70% of learning may come from actually doing the job, picking up from colleagues.ⁱⁱ This is not an argument for leaving any part of ECDIS training to

informal means, but to emphasise the need to practise what has been learnt.



A model for assessing training effectiveness is The Kirkpatrick Model

Level 1: Reaction	To what degree participants react favourably to the training
Level 2: Learning	To what degree participants acquire the intended knowledge, skills, attitudes, confidence, and commitment based on their participation in a training event
Level 3: Behaviour	To what degree participants apply what they learned during training when they are back on the job
Level 4: Results	To what degree targeted outcomes occur as a result of the training event and subsequent reinforcement

Of importance for the trainee's effectiveness, and the ship-manager or owner paying for the training, is that the training reaches through to levels 3 and 4. In other words that the underpinning knowledge learned during the generic and type specific courses flow seamlessly through to the job.

Many people today are comfortable studying online. They don't want to sit through classes when they can work at their own pace, with the opportunity to practise the skills and actions they need, which is more efficient for them. If e-Learning is interactive enough to give them hands-on experience, then e-Learning can be very effective.

The requirement for type-specific training

ECDIS manufacturers have an implied responsibility to deliver type specific training on their equipment. For example the MCA's MIN 405ⁱⁱⁱ states

"3.1 The ECDIS ship specific equipment training should relate to the make and model of the equipment fitted on the ship on which they are currently serving i.e. it will be necessary to attend a training course for each different system a Master or Navigation Officer is expected to operate. This training should build on the MCA approved ECDIS generic training, and be delivered by the

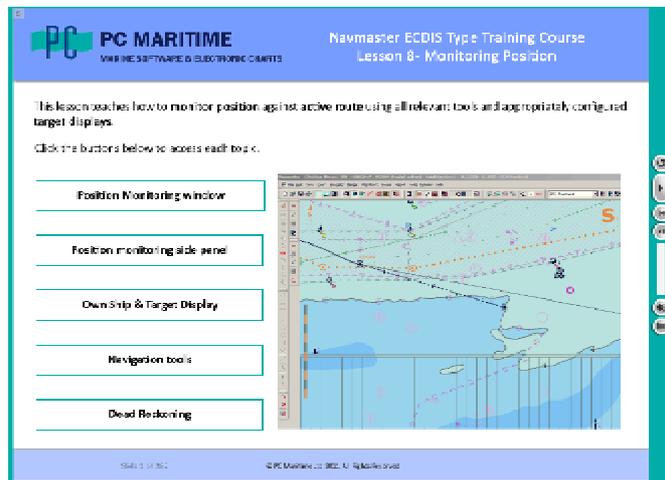
manufacturer; the manufacturer approved agent or a trainer who has attended such a programme. Trickle down training (i.e. one officer training another) is not acceptable as, inevitably, it leads to incomplete knowledge of the equipments capabilities, and especially the lesser used functions, being passed on."

Some administrations, including India, Ireland and Isle of Man, explicitly accept CBT for type specific training.

Computer Based Training

Mariners need a solution that minimises travel and expense, is available when and where it is needed, and gets the trainee up to levels 3 & 4. Computer Based Training (CBT) is highly effective for this because:

- It is ideal for teaching a process such as using software.
- It motivates with interaction and rich content (images, animations, simulations, voiceover).
- It can be used anytime, anywhere, for initial and refresher training or reference.
- It is self-paced. Users can work at the speed that suits them, repeating sections as necessary.
- It gives feedback, allowing users to measure their own progress.
- It provides documented and verifiable assessment via multiple choice and true/false questions, simulation and hot spot tests.



CBT, like any technical solution, can be developed to a higher or lower standard. At its simplest, it is an electronic book requiring nothing more from the trainee than to press the next button. This is hardly likely to be an effective training vehicle. In developing our Navmaster course we use:

- Text and voiceover
- Interactive simulations –the trainee takes part, pressing the buttons and mouse clicks that he would do on the actual ECDIS.
- Regular tests –which are taken before proceeding to the next topic. This helps to reinforce learning – even getting a test wrong helps users to learn.

There are some disadvantages: it does not give the contact that allows instructors to answer questions and give help when needed. This, I would argue, is of less importance for type specific training, where the skills and knowledge required are procedural. And CBT is time consuming and expensive to produce.



PC Maritime's Type Specific Computer Based Training course

PC Maritime has just completed a type-specific CBT course. Comprising seven lessons and needing about a day to work through, depending on the pace of the user, the course provides thorough and interactive training in all aspects of Navmaster's operation.

Each lesson consists of voice-over and text explanations, and video sequences demonstrating ECDIS processes. The user interacts frequently during training, carrying out actions as would be done on Navmaster. At the end of each lesson questions reinforce learning and give feedback on progress.

A final Assessment module contains all the questions. The test consists of a random selection from this question bank, taken under controlled conditions and documented. A high score is set to pass so that it is not possible to pass by guessing.

A help desk is available, should any clarification be needed, by email, chat, or an online class, led by a qualified instructor, at an agreed time.

Delivery

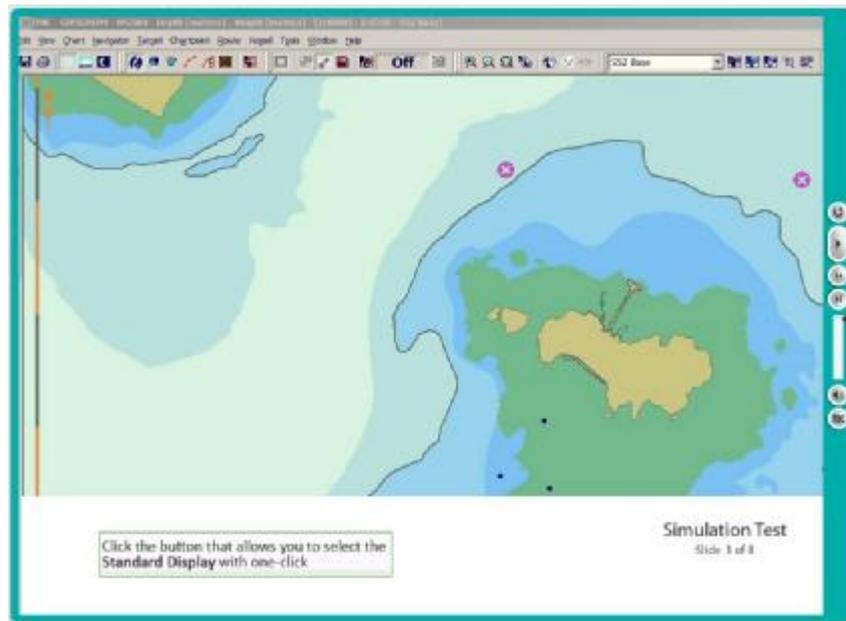
PC Maritime's course is provided on CD, for use on-board. Additionally access is available from our Learning Management System (LMS). The latter requires access to the internet, but provides additional benefits including:

- All lessons online. Users' completion of the course is tracked
- Assessment can be offered at the end, pass or retake
- Personal records are kept and progress tracked
- A certificate is provided
- Company Superintendent can be notified who has taken, completed, etc.

Navmaster ECDIS Type-Specific Lessons

1. *Setup and Maintenance*
2. *Basic Operation*
3. *Installing Charts*
4. *Working with Charts*
5. *Passage Planning*
6. *Preparing for a Voyage*
7. *Monitoring Position*
8. *Assessment*

Assessment



For type-specific ECDIS, the objective is for watch keeping officers to show competence in the operation and maintenance of the ECDIS. We therefore set detailed objectives for each of the seven lessons. The objectives are to a large extent mechanical. They require that the operators appreciate what they can do with the system, know where to find functions and can carry out tasks. They do not cover the principles involved, which are learned during the generic ECDIS course. Consequently, for type-specific training, the assessment should not, in my view, be too hard. It should be a good match to what operators actually need to do in real life.

The tests that can be used during assessment are varied and can include:

Multiple Choice	Users select one or more correct answers from a list.
True/False	Users choose either True or False (or Yes or No).
Fill-In-The-Blank	Users complete a blank in a sentence or phrase.
Matching	Users match entries in two lists.
Hot Spot	Users move the pointer over areas on the slide.
Simulation Assessments	Require the learner to perform actual work. Each step is stored separately.

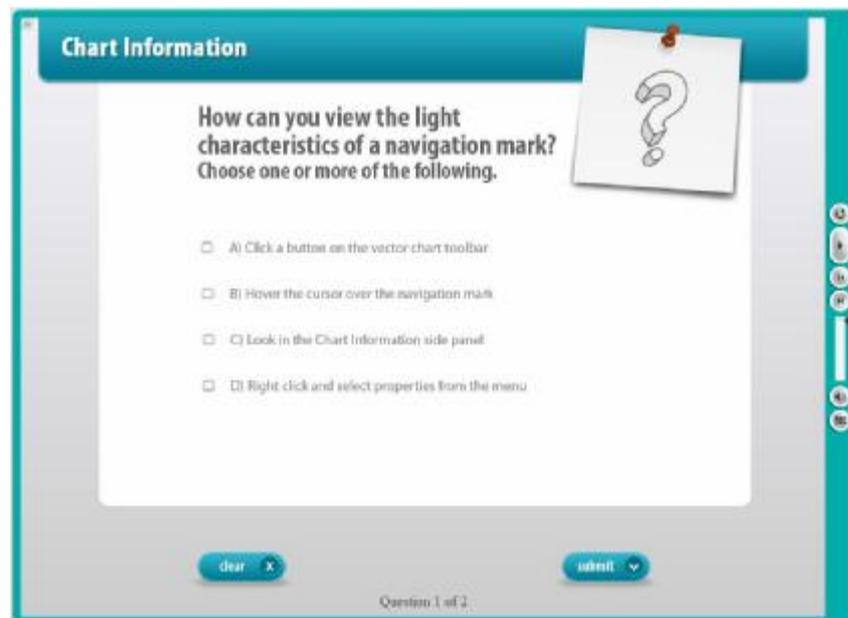
It is not possible for a user to pass the test by guessing.

With true/false questions it is possible to guess the right answer half the time, but increase the pass rate to 80% and the odds of passing by guessing reduce to 5%.

Guessing ...	Odds
5 out of 10	50%
80% passmark	5%
But with 20 questions	< 1%

And with multiple-choice, again, the odds stack up against guessing as soon as more than one right answer is required out of four or five possible answers.

Guessing ...	Odds
1 of 4	1:4
But with multiple of 4	1:16
And multiple of 5	1:32



When the assessment is presented from a CD ROM, it is taken under controlled conditions, with verification of the student's identity, so that his result is documented and a certificate issued if he passes.

Tests taken from the LMS, are also controlled. The LMS maintains records of the individuals who have taken the course, tracks their progress, records their results and issues a certificate when they pass the test. Interested parties, such as the ship manager, are automatically notified when the course has been completed and a pass certificate issued.

Approval

PC Maritime's type specific course is undergoing approval under DNV's Learning Programmes Standard. The objective of this standard is "*to ensure uniform quality of training in the maritime industry, independent of location, operation and training method. (and) ... ensure that training programmes offered within the maritime industry are properly designed (and) contain clear objectives for results.*"

References

ⁱ With 75% of the cost of training represented by logistics (travel, lodging, etc.), the global downturn has had the positive effect of making companies more open to new ideas rather than just sending people to a course. MTC's Bihl insists, "Everyone – the customer and the provider – should be focused on trying to measure the ROI of the time and money spent on training." Case Study Maersk Training Centre, Maritime Executive July - August 2009, Page 25

ⁱⁱ "An ASTD (2006) study identified the causes of "training failure" (ie training's failing to lead to expected results). It found that 20% was caused by events and circumstances *prior* to training. 10% was caused by sub-par delivery of the programs. And 70% was due to problems with what they called the "application environment". The latter consisted primarily of two factors: participants not having the opportunity to use what they learned, and nonreinforcing supervisors' actions following training." Training on Trial: How Workplace Learning Must Reinvent Itself to Remain Relevant, 2010 James D Kirkpatrick & Wendy Kayser Kirkpatrick.

"A Josh Bersin (2008) study showed a strong trend toward informal learning. 20% of job-relevant learning was found to occur *prior* to formal training programs, 10% during training, and as much as 70% as on-the-job learning." Training on Trial: How Workplace Learning Must Reinvent Itself to Remain Relevant, 2010 James D Kirkpatrick, PHd & Wendy Kayser Kirkpatrick.

ⁱⁱⁱ MARINE INFORMATION NOTE MIN 405 (M+F) Training for ECDIS as Primary Means of Navigation. (2011) Maritime and Coastguard Agency