A teaching tool for regulating students' thinking when troubleshooting under pressure.

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1. The Problem

Those involved in the training of Merchant Navy watchkeeping officers at Liverpool John Moores University (LJMU) understand that they have a limited timeframe to develop a student's understanding of and competency in bridge watchkeeping procedures. As a result, we need to ensure that the most is made of the time we have with the students to bring them up to the required industry standard.

Whilst theoretical understanding is an important aspect in the development of an officer (Bull, 2021), Simulator training is more immediately relevant to the daily work of their role (Carson-Jackson, 2010).

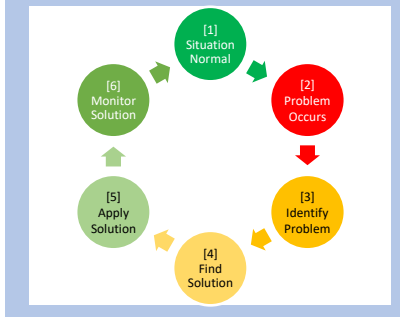
The nautical team at LJMU has witnessed thousands of students over the last twenty years who have struggled to put their theoretical knowledge into practice when faced with a simulated ship's bridge environment. This typically takes the form of them struggling in a disjointed fashion (characterised by confusion and misdirected energy) to perform their duties when they are presented with circumstances that they were not expecting.

Recognising that situations like this can sometimes generate overwhelming mental stress for the inexperienced, it was determined that an approach to help regulate student thinking was needed. When parallels were drawn with traditional teaching methods where mnemonics and other study aids are employed to aid students' comprehension (Alshatri *et al.*, 2019; Diron *et al.*, 2014; Kordjazi, 2014; Block *et al.*, 2009) it became apparent that a teaching tool for directing students towards how best to troubleshoot unexpected developments was required to help them deal with the constantly evolving, often high pressure, environment of the modern day ship's bridge.

A wide range of approaches to providing students with an 'educational ramp' were trialled over the years and these met with varying levels of success. However, the nautical team ultimately came to see that students perceive watchkeeping as a complicated task, the principles of which require simplification for them to initially grasp. This simplification was most effectively realised through the development of two models.

2. The Problem-Solving Circle

The Problem-Solving Circle presents students with an approach to troubleshooting that is based upon a practice that they are already familiar with. The well known Appraise, Plan, Execute, Monitor (APEM) process that they follow when constructing a passage plan for the journey that a vessel will follow (Khalique and Anwar, 2020). The circle has six parts:

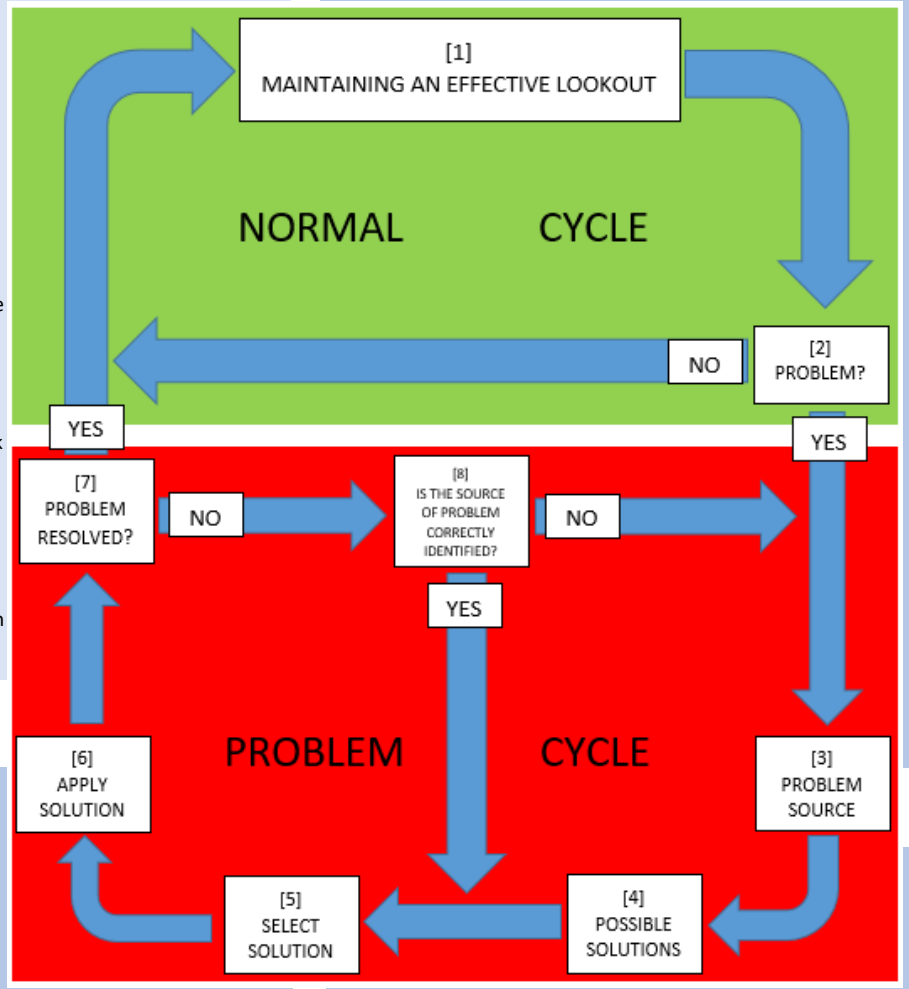


- Begin at Situation Normal [1].
- Realise that there is a problem [2].
- APPRAISE [3] the situation by gathering information to identify the problem.
- PLAN [4] how to resolve the situation by finding a solution and formulating a related course of action.
- EXECUTE [5] the plan by applying the solution that was identified.
- MONITOR [6] the result of the action taken by observing its effect upon the problem.

The most important of these steps is step 2, to realise that there is a problem in the first place (Bull, 2021). However, as students already have some experience in using this process to plan passages, it requires little additional training to allow them to deploy it towards other scenarios beyond its originally intended role.

3. The Warren Cycle

The Warren Cycle was designed to further develop the approach introduced by the Problem-Solving Circle. It is introduced at a later point in the course, once students have accumulated more experience and improved their understanding of the practical requirements of bridge watchkeeping. It divides the Problem-Solving Circle into two cycles. These have been termed the 'normal cycle' and the 'problem cycle'. Within the 'normal' cycle the watchkeeper is maintaining an effective watch and everything is proceeding according to plan [1]. An officer may be operating within the 'normal' cycle for days, weeks or months until a specific problem arises [2].



In a similar way to the Problem-Solving Circle, of all the steps in the cycle, step 2 – realising that there is a problem – is the most important. Upon realising that a problem exists, the 'problem cycle' is entered and steps can be taken to restore the situation to 'normal'. Here the key is to determine the nature of the problem correctly [3] so that possible solutions can be identified [4] before the solution most likely to succeed can be pinpointed [5] and applied [6]. After taking action, the outcome must be monitored to determine whether the action taken has resolved the problem [7]. If it has, we re-enter the 'normal cycle' [1]. If not, then the situation needs to be reassessed [8]. This will result in one of two outcomes:

- Another possible solution being selected from those already identified [step 8 and then 5].
- Reassessing the nature of the problem to identify its root cause, generating a new range of possible solutions, and then selecting a new option to pursue [step 8 and then 3].

The student may have to progress through this process multiple times until the problem is resolved and they have re-entered the 'normal cycle'.

A student is expected to follow this cycle when they are troubleshooting any problems that arise during an exercise in the ship's bridge simulator. Initially, the cycle had no name. This proved problematic for staff as they filled in session feedback forms. In need of an easily recognisable term of reference, they began to refer to the model as the Warren Cycle, after one of its principal developers and biggest champion. The name stuck.

4. Feedback

After being taught the Problem-Solving Circle, followed by the Warren Cycle, and then being provided with additional time in the simulator - to polish their skills - a student's troubleshooting ability whilst under pressure is greatly improved.

This improvement is evidenced by the vast amount of positive post-course feedback that has been received whilst debriefing the hundreds of students who have been taught using this approach. Of all of these, one particular student's response stands out above the rest. The student in question reported that their use of the cycle is now not just limited to bridge watchkeeping. They now also use it to organise their thinking in all sorts of high pressure situations: maritime related, academic, social and domestic.

With this being the case this poster offers the approach employed by LJMU's nautical team for use by others who might find it useful in their own teaching, coaching or mentoring and hope that it may prove beneficial to all concerned.