Software Solutions for the Model Courses Development.

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**Abstract:** The intensive development of the Information Technologies makes it possible to use widely the Control-Learning Systems in education standard knowledge and performance level included. The samples of program development and adoption to learning process provided with further automatic attachment to the Common Automatic Control System of the University existing or projecting.

**Keyword:** IT, IMO, education standard, user interface.

1. IMO MODEL COURSERS STANDARDS

For maritime training institutes worldwide, IMO has developed a series of model courses which provide suggested syllabi, course timetables and learning objectives to assist instructors develop training programmes to meet the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, (STCW), 1978, as amended, standards for seafarers.

The programmes of model training courses developed out of suggestions from a number of IMO Member Governments, following the adoption of the STCW, 1978, as amended. The model courses above are the basis of the educational programmes of the maritime training institutes. The model courses each include a course framework (detailing the scope, objective, entry standards, and other information about the course), a course outline (timetable), a detailed teaching syllabus (including the learning objectives that should have been achieved when the course has been completed by students), and guidance notes for the instructor and a summary of how students should be evaluated.

Some model courses require special equipment and simulators. In maritime training institutes with the large groups of cadets it is hard to arrange pre-exam tutorial and training due to insufficient quantity of the work positions.

E.g., Model Course – 1.07(RADAR Navigation, Radar Plotting and use of ARPA Model Course) requires a marine radar simulator with an instructor station and sufficient own-ship displays to accommodate the number of trainees. The equipment must incorporate at least two-ship stations (STCW code A-I/12 part 1 paragraph 4.3). It must be capable of simulating the operational capabilities of navigational radar equipment which meets all applicable performance standards of IMO. The performance standards for radar equipment are given in Assembly resolutions A.222(VII), A.278(VIII), A.477(XII) and A.832(19). A plotting table, plotting charts and instruments should be provided adjacent to each set. A classroom equipped with a blackboard or flipchart and an overhead projector, slide projector or viewgraph, as appropriate, is also needed for teaching the theoretical part of the course.

The model course above is predestinated for the avoidance of the collisions have been frequently caused by failure to make proper use of radar and radar plotting aids in both restricted visibility and clear weather. In close-quarters situation developing the common error is the altering course on the basis of insufficient information and maintaining too high a speed. Information provided by radar and radar plotting aids in clear weather conditions can assist the watch-keeper in maintaining a proper lookout in areas of high traffic density.

Due to the lack of work positions of trainees the instructors are to increase lecture hours and to reduce simulator hours thus the standards of competence for seafarers may be not achieved. Needless to say that the
lecture thesis may be effective just if supported by the practical exercises. The curriculum may be improved with the help of Information Technologies (IT). The PPI (radar screen) of the contemporaneous ships’ radar is practically the same as a computer screen. And personal computers are much more available than the special simulator equipment. Therefore some competences Model Course – 1.07 required may be achieved with the help of the personal computers appropriate software provided with. And after computer based learning course the competences of the cadets may be confirmed by simulator training.

2. SOFTWARE FOR MODEL COURSE – 1.07

For model courses competences achievement in the Admiral Nevelskoy Maritime State University (MSU) the series of control-training programs has been developed and tested in the teaching and learning activity and may be of utility to the teachers an cadets of the maritime learning institutions.


The sample of the software above is “Radar Screen Close Quarters Simulation with the Avoidance Maneuver Performance” (registered in the Federal Intellectual Property Service).

This program has been designed and suitable for habit formation of the manual radar plotting skills which are the base for the proper understanding of the radar observation and ARPA principles.

The radar screen performance presented in the Fig.1. The common radar handling controls are located in the screen bottom: range, echo trail, orientation – left corner; EBL, VRM – right corner. The ship movement controls as auto pilot and toggle are located in the top left of the screen. In the top right of the screen the timer handling control is located. The timer can work in the real time mode or may jump forward or backward.

Initially the close quarters situation may be randomly created (up to 5 targets simultaneously) or may be created by the teacher himself. The competencies from the Model Course – 1.07 to be plasticized:

- Measure ranges and bearings;
- Construct the relative motion triangle;
- Determine course, speed and aspect of other ships;
- Determine CPA and TCPA;
- Recognize the effect of course and speed changes;
- Report radar plot data;
- Application of COLREGS to avoid collision or close encounters;

The plotter sheet performance is presented in the Fig.2. In the left bottom corner the dialog window presented the help demo control with the standard manual radar plotting procedure: 1st point (00min), 2nd point (03min), 3rd point (06min). The demo procedures may be arranged as step by step and as automatically performance.

The true motion performance is presented in the Fig.3. In the tutorial mode the trainee can observe the true movement of the vessels.

The maneuver characteristics of the own ship is presented in the Fig.4. Course and speed changes performed in correspondence with the table above.
Program Mode management performed with right button mouse click pop-up Menu Test.

The features available are as follows:
- results view of the former completed Control Tests;
- feasibility of testing out of ICT room with further insertion of the results into Common Database;
- performance appraisal rating system;
- Display representation of the execution time of the Control Test;
- simulation of the relative motion and maneuvers of the vessels of the various sizes and various maneuver particulars (up to 5 targets simultaneously);
- course change n speed control;
- simulation of the ship radar with moving targets and the possibility of the performance management:
  - range scale, variable range marker, electronic bearing line, fixed rings, course and north orientation;
- interface of the radar plotting performance;
- teacher interface for the scenario of motion creation;
- random selection of the source data with the teachers' possibility to create his own test job in this base;

The identification of a trainee arranged with the Registration procedure if required. The Registration procedure is common for every program developed in the scope of MSU series of control-training programs.

If the trainee is working in TCNET of the MSU under his own account Registration procedure not required: the results of the Control Tests fixed in university network automatically.

At the Registration on the personal computer the trainee input his name just once and in this case his person directory to be created which collected the results of his control tests further to be transferred to the teacher with the memory stick or transmitted by e-mail.

Results also may be reviewed at any time with the results tables after the test completion. The interface is clear and convenient for users and no need for detailed instruction. The trainee can look over the results of the previous tests and every maneuver if registered.
The teacher also has the possibility to look over the results of every test of every trainee with the competencies evaluated (Fig. 5). Every test may be retrieved and mistakes if any should be discussed and explained.

The programs are free distributed under the terms of the User Open License therefore a trainee can prepare the tests in his own personal computer and transfer the results to the teacher as by e-mail and/or by flash memory stick.

CONCLUSIONS

The intensive development of the information technology offers the existing possibilities for the control-training system application for computer-based learning in the process of education and extends the wide possibilities for the students’ record of the knowledge level and students performance. The databases of every group may be integrated into common database of the University Automated Control System [2]. At the moment just a few control-training programs prepared for IMO Model Courses implementation. It seemed worth to arrange common group of the teaching staff of the maritime training institutes and programmers under the supervision of the IMO Sub-Committee on Standards of Training and Watchkeeping for developing and implementation of the software for Model Courses development.

REFERENCES
