

AUTOMATIC EVALUATION OF STUDENTS IN THE „INTEGRATED SIMULATOR FOR DRIVING OF WATERCRAFT”

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Abstract: "Mircea cel Batran" Naval Academy purchased in 2009 a complex of operational maritime simulators named "Integrated simulator for driving of watercraft" type Navi-Trainer Professional 5000 manufactured by TRANSAS Limited Co and certified by DetNorskeVeritas (DNV) as A class (full mission) for bridge and machinery. For the evaluation of the students, the simulator has the Transas Evaluation and Assessment System (TEAS) module. The Transas Evaluation and Assessment System (TEAS) allows assessing objectively the correctness of an exercise fulfillment by a student. The correctness of the exercise fulfillment can be assessed after the end of the exercise during the playback of the exercise log.

Key-words: simulator, TEAS, evaluation, assessment.

1. INTRODUCTION

„Mircea cel Batran” Naval Academy (MBNA) purchased in 2009 a complex of operational maritime simulators named "Integrated simulator for driving of watercraft" type Navi-Trainer Professional 5000 manufactured by TRANSAS Limited Co and certified by DetNorskeVeritas (DNV) as A class (full mission) for bridge and machinery.

The main capabilities of the bridge simulator [2-3] are:

- plan and conduct a passage and conduct navigation;
- maneuver and handle a ship in all conditions;
- maintain a safe navigational watch with Electronic Chart Display and Information System (ECDIS), Automatic Identification System (AIS) and Ship Security Alert System (SSAS);
- use of radar and Automatic Radar Plotting Aid (ARPA) to maintain safety of navigation;
- respond to emergencies and distress signal at sea;
- conducting telephone conversations via Intercom and Very High Frequency (VHF) station;
- plan a voyage;
- co-ordinate search and rescue operations;
- establish watch keeping arrangements and procedures;
- operate remote controls of propulsion plant and engineering systems and services.

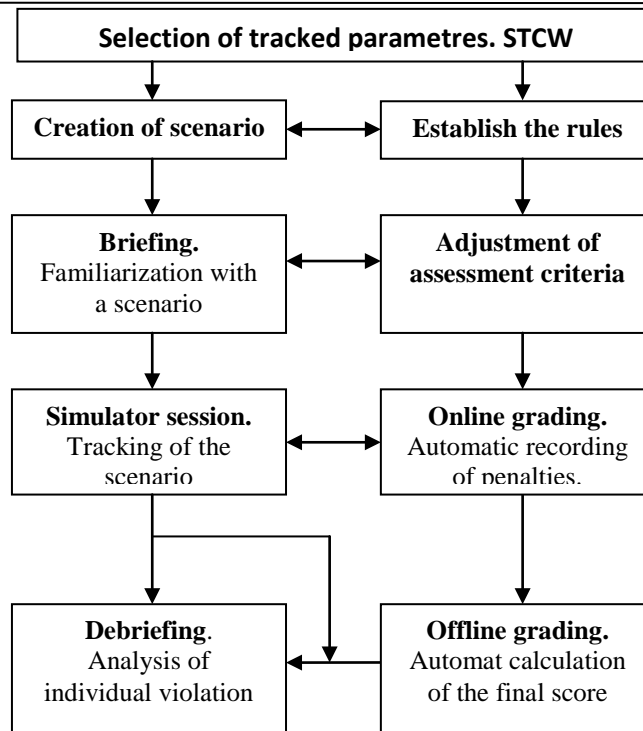
2. THE EVALUATION AND ASSESSMENT MODULE

For the evaluation of the students, the simulator has the Transas Evaluation and Assessment System (TEAS) module. The Transas Evaluation and Assessment System (TEAS) allows assessing objectively the correctness of an exercise fulfillment by a trainee[1]. The assessment is based on the check of the exercise fulfillment correctness with regard to the selected set of criteria.

The by-criterion check consists in comparing the exercise assessment parameters to the set limit values according to the set rule. In the by-criterion check, at each moment of time a relative error is recorded (relative deviation of the assessment parameter from the limit values), and penalty points are calculated as a function of the relative error and the "error weight". The overall sum of penalty points in the observation interval is calculated as a sum of penalties at each moment of time by each assessment parameter. By-criterion check may be unconditional (i.e., it is performed throughout the exercise) or conditional (performed when the set logical condition is fulfilled).

The trainee competency is assessed in points (Score %) starting from 100% minus penalty score.

The instructor procedure for handling the TEAS is shown in the diagram below [3]:



The TEAS is comprised of three components:

- Exercise assessment rules editor (“Rule Editor”), which is used for creation and editing assessment rules;
- Exercise assessment module (“Grading Panel”), which is used for displaying assessment process during exercise;
- Training Report that can be generated on exercise completion.

The Assessment Rules Editor is intended for creating, editing and saving a “Competency Assessment Scenario” as a set of rules for the assessment of exercises on NTPro 5000 navigational simulator. Each rule is described by logical expression built on principles of Boolean algebra.

During the exercise, information on violations and instructor prompts are displayed to the trainee on his/her Conning Display (“CAS” page), an on top of the central visual channel if the channel has an appropriate parameter in the simulator configuration.

The instructor formed rule includes:

- text description of the rule;
- tracked parameter;
- logical expression formalising the rule;
- penalty point amount charged for the violation of the rule;

- penalty point weight.

The list of tracked parameters is provided to the user ready made (this list may be extended from one version to another). The list currently contains more than 60 assessment parameters divided into following Penalty categories: voyage planning, watchkeeping, navigation, COLREG, traffic regulations, shiphandling and maneuvering.

Operations, parameters (variables) and constants are used for creating competency assessment rules. Operations may be of two types: logical and

numerical. The uppermost node of the rule to be created always contains the below logical operations.

Depending on the selected logical operation type, available in the subsequent subnodes may be either logical operations or numerical operations. Numerical operations are available if the following logical operation types were selected in the topmost node: Equal (=), Greater or equal (>=), Greater (>), Less or equal (<=), Less (<), Not equal.

The type of logical operations sets the pertinent types of parameters which can be used in making up a rule. The following parameter types are currently used:

- Logical – parameter setting a certain event (state);
- Numerical – parameter which has a numerical value;
- Enumerable – parameter which has a pre-determined set of states;
- Zone – parameter setting a space within which, as a rule, other parameter types are monitored;
- Temporal (timer) – auxiliary parameter setting the time interval within which other parameter types are monitored.

The select “assessment parameters” are automatically checked by the “criterion” and the current assessment of the exercise fulfillment correctness is calculated as 100% minus a sum of penalty points currently obtained for all the “assessment parameters”.

If the current value of the final grade is below the Passing Score threshold value, “Failed” message is displayed in red in the last “Result” column rather than “OK”.

In the course of an exercise, all the “assessment parameters” are recorded in the exercise log regardless of whether they are used in the current “competency assessment scenario” or not.

3. CONCLUSIONS

The TEAS module is a real help for instructors as it provides an objective assessment of the trainees.

The correctness of the exercise fulfillment can be assessed after the end of the exercise during the playback of the exercise log. The Training Report is created automatically at the moment when the log file is loaded in the instructor program.

The trainee’s proficiency growth can be assessed by comparing the results achieved by the trainee on one and the same exercise in different training periods. Similarly, the competency assessment can be performed by comparing

resultsgained by the trainee with the “ideal” results. For the “ideal” result, the log of the exercise completed by an expert (instructor) can be used.

REFERENCES:

- [1] ***, 1995. Standard of Training Certification and Watchkeeping (STCW) Convention
- [2] Transas Ltd, August 2009. NAVI-TRAINER 5000, Navigation Bridge, (version 5.00)
- [3] Transas Ltd, August 2009. NAVI-TRAINER 5000, Instructor manual, (version 5.00)