

LEARNING ANALYTICS IN MILITARY TRAINING SIMULATION

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Learning analytics (LA)

“The measurement, collection, analysis, and reporting of data about learners and their contexts for purposes of understanding and optimizing learning and the environment in which it occurs” (Long & Siemens, 2011, p. 34).

Goal

For two military simulation-based training programs a learning analytics dashboard has been developed to support:

- Instructor feedback
- Monitoring trainee’s learning trajectory over time
- Evaluating the training program

Technology

Experience API (xAPI), a standard to store and process learning data, has been used for implementation.

CV90-embedded gunner training

Training for CV90 gunner:

- Procedural shooting task
- Computer Assisted Instruction



LA Approach:

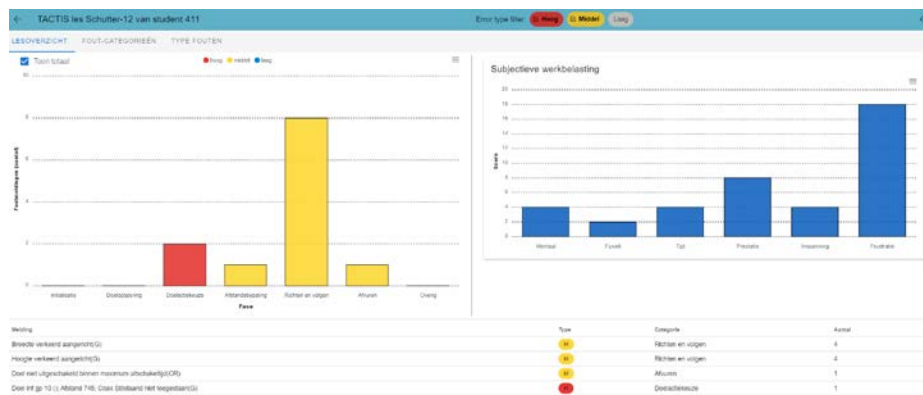
- Explore simulator dataset for meaningful performance indicators
- Measure trainee’s subjective experience (e.g., motivation and workload)

Data analysis example:

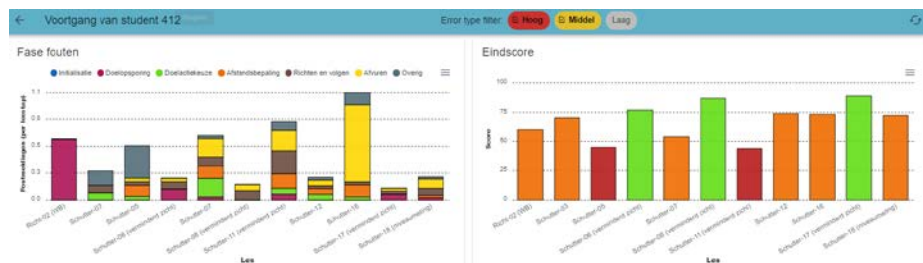
Significant correlations (Pearson) between subjective measures and simulator performance measures (More analyses in: Pennings et al., submitted; Pennings & Oprins, submitted).



Dashboard example: After-Action-Review



Dashboard example: Trainee trajectory



Ship-handling-simulator navigation training

Education for Officer of the Watch:

- Complex navigation scenarios
- Feedback based on instructor observations



LA Approach:

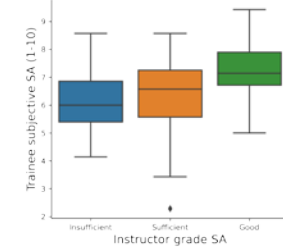
- Focus on situational awareness (SA)
- Measure 4 types of data:

- 1) Navigational ship data
- 2) Trainee behaviour (systematic observations)
- 3) Instructor performance grades
- 4) Subjectively experienced workload and SA

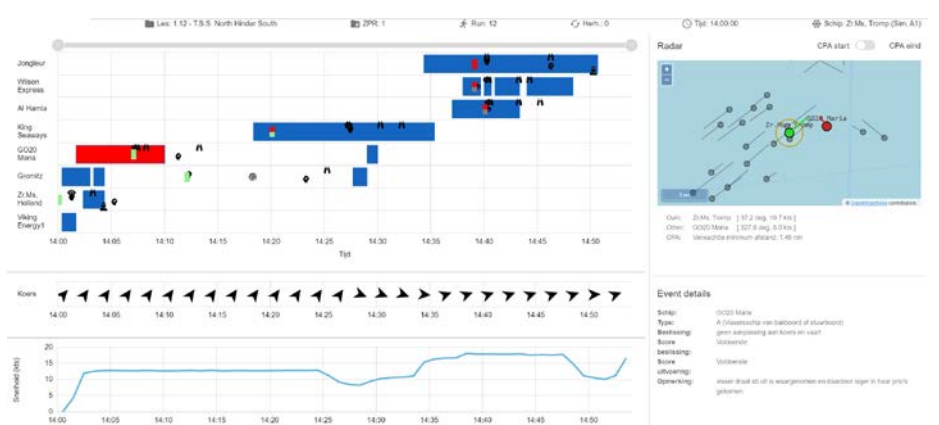
Data analysis example:

Trainee subjective SA correlates with the instructor SA rating (Pearson’s $r = 0.31$, $p < 0.001$).

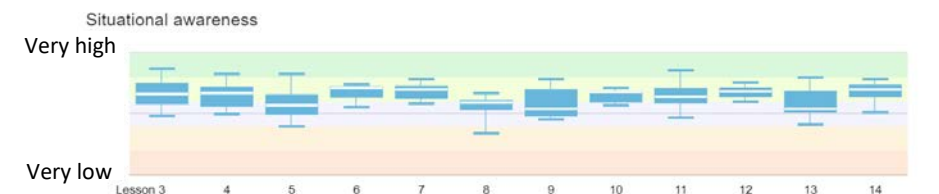
Subjective SA vs instructor-graded SA



Dashboard example: After-Action-Review



Dashboard example: Evaluation training program



Conclusions

- Future users believe visualizations of objective simulator data will significantly contribute to the learning process
- Customized LA approaches are necessary to match user requirements and simulator characteristics