



Theunissen, N.C.M. nicolet.theunissen@tno.nl
 Stubbé, H.E.
 Boot, E.W.
 Six, C.
 Harbers, M.
 van den Bosch, K.

Creation of learning environments for critical tasks

Abstract

Traditional training methods for people working in 24/7 organisations no longer suffice. These methods are too rigid in their approach and fail to prepare 24/7 professionals in time. Four principles for the development of learning solutions for 24/7 professionals are introduced that overcome the problems of traditional training methods. To illustrate these four principles, three research projects will be described that aimed at the grounded development of a learning environment.

24/7 professionals, a definition

Employees of organisations operating on the basis of 24 hours a day and 7 days a week (24/7) continuous services.

(e.g. maintenance, logistics, manufacturing, petrochemical industries, military, safety & security organisations, viz. the police, the fire department and medical support troops)

Educational challenges

1. How to prepare them more quickly and in a more flexible way, while still maintaining quality?
2. How to enable them to prepare themselves for critical tasks more quickly, more effectively, and last minute?

Challenges for 24/7 professionals

- Changing and demanding environments
- Large responsibilities
- Information overload
- Changing teams
- Constant external pressure (politics, media)
- Structural lack of time for training and instruction
- Lack of competent instructors
- Limited means to develop, provide and evaluate training & instruction

Therefore:

Need to acquire skills for complex tasks on their own. This requires improved self-directedness and problem-solving capability.



Examples of grounded development for 24/7 professionals

Adventure-based learning environment to prepare physicians for military expeditions

1. Context-relevant features.
2. 'Natural' feedback helps learners to develop self-reflection and self-knowledge.
3. Adventure-based learning incorporating the specific real-life context.
4. Scenarios based on a sequence of scenes that can be adjusted and adapted to reality anytime.

Ubiquitous learning environment for First Responders

1. Can be integrated in ubiquitous computing working environment.
2. Learners can decide for themselves where and when they want to learn.
3. Scenarios place the learner in the real-life context.
4. Modular approach enables a rapid change of the assignments or problems facing the learner.

Explainable AI in simulation-based training systems

1. AI 'instructor' available in the workplace.
2. Encouraging the learner to train (individually).
3. Simulation-based training (authentic setting).
4. Once developed, AI can be applied in different simulation-based training systems with new scenarios and goals.



1. Facilitating on-the-job learning

- Workplace provides realistic learning tasks
- Impact of learning high (transfer and retention)
- Employees are not taken out of the working process
- Learning period is short
- Large impact on 24/7 operational targets

3. Incorporating the real-life context in the training

- Immersion in the real-life context
- Physical and mental stressors
- Evokes coping techniques to endure extreme context
- Improves critical task performance in extreme conditions
- Subjects less distracted and hindered by the context

2. Stimulating continuous learning

- Create learners for life
- Stimulates self-directed learning
- Continues after 'finite' education
- Pro-active and flexible employees
- Improves the quality of work

4. Using a rapid development approach

- Iteration instead of linear waterfall models (ADDIE, ISD)
- Possible to adapt to changing requirements
- Interim versions of learning environment can be used
- Start training and instructing at an early stage
- Save precious time



Conclusion

The resulting new (and usually attractive) learning solutions, including the latest learning technologies and instructional design, would ideally entice the 24/7 professionals to open up to learning itself. These new types of learning environments are also in better sync with the learning preferences of younger people – the so-called net generation – meaning that expensive dropping out of education could be avoided.

Ultimately, this will lead to people develop problem-solving capabilities and self-directedness, resulting in more effective learning (transfer of training) and efficient learning (time), thus bringing the operational targets of 24/7 organisations within reach.