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## Serious Games – A New Perspective On Workbased Learning

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### Abstract

Since the foundation of the Serious Games Initiative of David Rejeski and Ben Sawyer in 2002 games from the genre of Serious Gaming have attracted increasingly special attention. Besides, it concerns (computer) games which do not serve excluding the entertainment, but contain such compelling elements. They serve primarily the mediation of information and education. In the area of vocational education and continuing education Serious Games are suited in particular when it is a matter of providing technical and standardized or difficult and complicated learning contents. By combining playful elements and requirements of the work process Serious Games promote the learning and achievement motivation. Furthermore, the interaction with the game generates procedural knowledge. How Serious Games can be done as an innovative way for workplace learning, is illustrated in the article on the basis of the first intermediate results of an empirical project on handling of heavy goods at the port.

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### 1. Main text

Meanwhile digital media supported learning processes are a matter of course. Simultaneously we consider a growing interest in workplace learning. The relocation of learning into the real corporate work process is increasingly dominating the shaping of processes in the companies on the one hand as well as vocational educational

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research on the other hand. The reasons for this development are the direct usability of learning outcomes in the work process, the relevance of problem-oriented learning for skilled workers as well as semiskilled workers and the long-term value of acquired experience knowledge for the occupational practice (Spoettl et al. 2012). The contribution discusses the question how game-based surroundings are able to promote workplace learning. Serious Games are not a new idea. Military officers as well as aeronautical research have been using war games or dangerous situations in order to train strategic skills for a long time. Meanwhile, the technological development permits the development of game-oriented applications with high quality and low costs. Digital game-based technologies are initiating the field to redefine what is meant by learning and instruction in the twenty-first century. The working definition of Serious Games says, that such games do not have entertainment or fun as primary purpose but rather than an educational purpose. This does not mean that serious games should not be entertaining. Playing the game triggers learning processes. Besides, the entertainment value of the game is not excluded, but is used rather as means for the learning process. Recent research have identified that game-based learning is a viable way to help learners to construct knowledge from ambiguity, trial and error, and to assimilate new knowledge (Adcock 2008). Games refer to structured play which is voluntary, intrinsically motivating, and involves active cognitive engagement. Game-based learning enables learners to undertake such tasks and experience situations which would otherwise be impossible and/or undesirable for cost, time, logistical and safety reasons. A game differs from a simulation in such a way that it is intrinsically motivating and involves competition. Games and their associated obstacles also create a positive kind of stress, called eustress, which is actually good for the player, providing him with a sense of motivation and desire to succeed. The motivation can be promoted by interesting game scenarios which are contextualized through work-based tasks and processes.

The current work of harbor skilled workers is marked by dealing with complex technologies, requiring cooperation and practical acquisition of process understanding as well as social competences, the readiness for lifelong learning and working in changing work tasks and environments. Furthermore the workers need basic knowledge of physics and mathematics. The initial assumption is that game-based learning environments are suited in a special way to impart abstract theoretical knowledge as well as action-oriented knowledge. Game-based learning environments support the learning of abstract knowledge to promote the learning performance.

In our knowledge society, the acquisition of systematic theoretical knowledge is undoubtedly gaining importance. Schön emphasized the role of action in shaping the content of tacit knowledge. He observed that when actions lead to unexpected action outcomes, reflection on assumptions that gave rise to the action is prompted, which augments tacit knowledge. He distinguished between the reflection-in-action, which occurs on the spot, and reflection-on-action, which occurs retrospectively (Schoen 1983). According to Dewey (1938) Serious Games enable “experience plus reflection equals learning.” Therefore, it will be necessary, to consider reflection possibilities as crucial didactical aspect designing Serious Games.

The challenge is to design a Serious Game for the particular work processes in the harbor as learning context. Just the maritime economy registers an increase in complexity, mechanization and interface management. The requirements profile of the professional forces for harbor logistics has changed and extended. The research project “work process oriented competence development for the harbor of the future” (<http://www.arkoh.de>, financed by the Federal Ministry of Education and Research) focusses on two work processes: Firstly, the loading of offshore wind energy components. Secondly container-related activities like loading, storing and movement (“stuffing and stripping”) of containers and also the securing of load. Especially when loading and transshipping heavy equipment in ports – e.g.: for the offshore industry experience-based knowledge plays an important role. The employees must have a sense of forces and weights. They have to be able to handle with ground conveyor, reach stacker as well as straddle carriers. The transport of components for offshore wind turbines is one of the special challenges of heavy load transporters because there are less standardized processes.

## **1. Serious Gaming as an Innovative Way for Workplace Learning**

Research results have pointed out that there are at least six key properties for Serious Games to promote learning processes (Shute / Ke. 2012)

- an underlying rule system and a game goal to which the player is emotionally attached,

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