Learning workplace skills through gaming

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In the current economic environment, highly skilled, productive and efficient workers are among a company''s best assets. But keeping employees at peak performance and teaching them new skills requires effective life-long learning. A technology-enhanced approach to learning, combining elements from serious games and learning theories, now being developed by EU-funded researchers.

Training programmes, seminars and workplace learning courses are widely used today by organisations of all sizes looking to develop employee skill sets and build competence in performing different tasks. Many focus on reducing so-called "Time to competence" (TTC), the period it takes for an employee to be proficient in a certain role. The main route to shorten TTC is a bespoke face-to-face or blended course, which tends to be resource-intensive - courses cost money and time to set up and run, and workers often need to miss work to attend them. In addition, it is widely recognised that a classroom approach to learning is less effective and engaging than practice-orientated, interactive methods.

"Ideally, if you''re trying to train someone to be a project manager you want them to experience being a project manager and learn the skills on the job, so to speak. However, it is risky and potentially very costly for a company to put someone without the right training in such a position, they could make mistakes or be ineffective," says Dr Hans Torvatn, a senior research scientist at the Institute of Technology and Society (SINTEF) in Norway.

But what if they could take on the role of a project manager, experience

the challenges of the position, make mistakes, learn from them, and try again?

That is the thinking behind a project managed by Dr Torvatn to develop a game-based approach to training using virtual reality (VR) environments and simulations to quickly and cost-effectively teach knowledge workers new skills. Called "Transformative, adaptive, responsive and engaging environment" (TARGET), the project is focused on methods and tools for cost-effective dynamic competence development, with flexible learning contexts of varying complexity and longevity. TARGET has a budget of EUR 9.4 million, with funding of EUR 6.8 million from the European Commission. The consortium involves 15 partners from 11 European countries.

Although games, VR and simulations are already well established training tools, they have mostly been used to date to teach people specific technical skills or enhance existing ones through practice.

"For example, there are training simulators for doctors who perform surgery to improve their dexterity or for resource managers to practice planning, but in TARGET we are focusing on what could be described as "soft skills" or higher cognitive skills, things like negotiation, trust-building, leadership and communication," the project manager explains. "TARGET is built on modern approaches to pedagogy and learning, especially ideas on personalised learning and learning plans, where Threshold Concepts play a key role. One may perceive a Threshold Concept as a gateway in a particular knowledge domain, which once mastered, leads to emergent new knowledge as the individual"s understanding is expanded and they are transformed into thinking like a practitioner."

The approach addresses several key learning challenges, including taking into account that each learner is a unique individual, with different

cognitive abilities, emotional intelligence, personality, knowledge and experience. Therefore, Dr Torvatn says, it is not feasible to develop a single solution tailored to all learners, but rather it is necessary to support mass-individualisation. The problems are exacerbated by the need to retain the capacity to handle unpredicted events, meaning that at least some of the learners/managers in an organisation need to attain novel ways of understanding and the ability to think with different perspectives.

For the trainee, learning begins by logging into the TARGET platform and undergoing an analysis to determine their learning goals and build a personalised learning plan. They are then offered a range of different stories or scenarios to choose from, in each of which they take on a specific role that they play out as an avatar in a virtual reality environment. The project team have so far designed three scenarios - "stakeholder management" (SM), "sustainable global manufacturing" (SGM) and "social architect" (SA) - under which the system was evaluated with engineering, project management and business school students.

What would you like to learn today?

If a worker needs to develop interpersonal skills for conducting business in highly dynamic, complex and demanding social environments, for example, they might be guided to play the role of an energy company manager negotiating with a town mayor, a farmer and an environmental campaigner about the installation of a wind farm.

If they need to develop leadership abilities and build experience in managing multi-cultural business relationships they might take on the role of a manager charged with putting together a team for a new project.

Or if they need to develop long-term critical and strategic thinking skills, they might play as a sustainability manager attempting to draw up a sustainable global manufacturing strategy for a medium-sized company, where the CEO supports the strategy but the rest of the key stakeholders do not.

"As part of the total evaluation efforts the three scenarios have been evaluated in trials by different project partners involving more than 60 participants across Europe. However, evidently many different scenarios are possible depending on the needs of the employer and the employee," Dr Torvatn says. "The training they receive is interactive, engaging and highly personalised to their requirements, depending on the skills they need to develop for the job they plan to perform."

Within each game, the roles and attitudes of different "Non-player characters" (NPCs), along with other factors, can change dynamically to meet specific requirements - such as becoming more confrontational or delaying tasks within a project. A "Competence performance analyser" (CPA) looks at each player"s performance during the game and scores them on different skills. When the session is finished, the CPA gives them visual feedback in the form of video playback of what they did, correlated with their scores on a timeline, therefore supporting the necessary reflection for learning. Players are also able to interact with other participants and share experiences in a VR social space called the "Lounge".

"Players can play the games as many times as they like. They can try different strategies, make mistakes, reflect on them and learn from them. In that way they learn from experience - it"s a case of practice makes perfect," Dr Torvatn says.

The main problem that the TARGET team had to overcome was to transform theories of learning into models that software developers

could use to develop the various components, and then integrate them into a total system. There were also other technological challenges, such as enabling dialogue between players and NPCs and the personalisation of stories tailored to the individual"s learning needs.

"The system is a prototype and some features undoubtedly require more work," Dr Torvatn acknowledges. "However, there is a lot of interest in the platform, and especially in this approach to reducing time-to-competence for knowledge workers, particularly as using VR and games in this way is considerably less expensive and time-consuming than devising personalised real-world training programmes."

Several of the project partners plan to continue work on the platform now the project has ended and the team are interested in using the technology commercially to design game scenarios for companies to train workers to meet their specific business requirements.

"In the future, this approach to training and skills development is likely to become more widespread. If you look at the younger generation of workers and workers now entering the workforce, they are very accustomed to playing games and to this style of learning. They won"t just need this sort of interactive, personalised training, they will in fact demand it," the TARGET project manager says.

More information: cordis.europa.eu/fp7/home_en.html

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