Blending immersive and educational technologies to inform sustainability and diversification of workforce training through machine interface learning using sterilization technologies as model – quo vadis?

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The healthcare products market is a diverse market supplying critical care products ranging from pharmaceutical products to biologics to medical devices. The regulation and best practices associated with the manufacture of such devices is very well documented in ISO standards, AAMI Technical, European and US Pharmacopeia. As part of Good Manufacturing Processes, regulations and requirements must be translated to working operation procedures that deliver consistent and controlled processes fully compliant with delivering safe healthcare products for critical patient care.

As much as industry is focused on the documentation of such processes and regulation the delivery to the manufacturing operations it reliant of well trained and competent personnel tasked with delivery. The requirements and focus on competence is something being further highlighted in new Medical Device Regulation. Training and competence development remains mostly grounded in traditional methods of training against a backdrop of highly innovative processes and technology advancements.

Likewise the provision of specialist training in the healthcare workforce merits innovative approaches using technology as a tool in competence development. In the context of specialist training and educational programmes, Immersive Multimedia (IM) technologies such as Virtual reality (VR) are emerging as potential platforms based on their delivery of 360° visuals, spatial audio, and allowing the learner to move beyond the passive mode towards an active participant in their learning experience. These presentation technologies in conjunction with various wearable sensor technologies capturing heterogeneous user physiological metrics in addition to task performance and user interaction facilitate a true “human-in-the-loop” system that supports adaptive, personalised whilst maintaining context based learning. The capture system identifies, at the individual level, key abilities of the learner which then informs how the presentation system challenges the learner thus optimizing the learner experience.

To ensure efficacy, it is paramount that any training agenda adopts a suitable evidence based theoretical framework for which to interpret and evaluate results against. Cognitive Load Theory (CLT) provides an auspicious framework for this project for numerous reasons. It is regarded as one of, if not the most evidence informed educational theory for training and learning and provides best practice guidelines based on this evidence for how to deliver and evaluate instructional methodologies such as the use of IM and VR. Furthermore, as this project utilizes physiological and psychological measurements to provide insight into learning and performance data and CLT is directly associated with the cognitive capacity of trainees, as an underpinning framework it allows for a seamless integration of an educational paradigm within Medtech training.

It is envisaged that such immersive approaches to training and development could deliver significant benefit to healthcare industry in highly technical areas such as aseptic manufacturing, cleanroom control, sterilization processing and laboratory testing. Some potential examples will be explored and explained with an objective for further collaboration.