



CONESTOGA

RESEARCH, INNOVATION
& ENTREPRENEURSHIP

Digital Simulation of Provincially Licensed Meat Plant Food Safety Training

Nicole Detlor, Stacey Dineen, Russell Foubert, Colleen McCann, Lisa Trimble, Renuka Waduge
Research, Innovation & Entrepreneurship, Conestoga College, Kitchener, ON



Supported by
OMAFRA



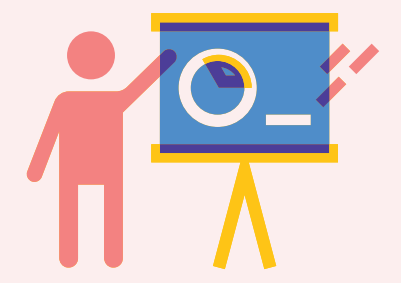
BACKGROUND

Good Manufacturing Practices (GMP) are the operational and environmental conditions required to produce safe foods. They ensure the environment of food production promotes food safety and that all ingredients and packaging materials are handled safely. GMPs cover materials and products, premises, people, procedures, and processes. Effective training of workers to support compliance with GMP to ensure food safety is critical. Worker training and competency can vary between federally regulated meat processing facilities and the provincially regulated facilities (Fong et al. 2017). The federal government and the government of Ontario have identified this as a priority, investing \$900,000 to support recruitment, retention, and innovative training initiatives in Ontario meat processing plants (Government of Canada 2021).

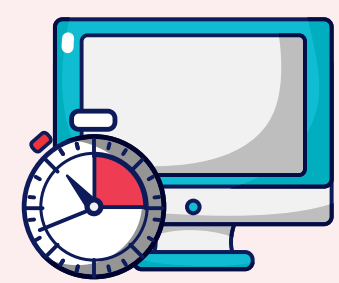
PROBLEM STATEMENT

Traditional, instructor-led, employee food safety training sessions at meat processing plants have been criticized for overall ineffectiveness at promoting and reinforcing the attitudes and behaviors necessary to ensure best practices for safe processing. As a result, employers may face significant compliance risks. Digital learning simulations, such as extended Reality (XR), represent interactive and intuitive ways to learn complex procedures. These solutions meet the challenges above by allowing trainees to progressively explore, learn, and rehearse the vital processes that support safe practices. The training modules developed through this project are accessible, detailed, and self-explanatory. Recent research suggests both actual and perceived learning increases in safety-critical industry training when immersive VR is incorporated as part of the training (Andaluz et al. 2017, Doolanie et al. 2020, Pendram et al. 2020)

DEVELOPMENT



Both VR and 2D video-based training techniques provide similar and considerable higher retention of training after 7 days compared to traditional training methods.



Reduction of training time, making adoption of the technology cost effective.



Activities within VR training provide an opportunity to explore hazard recognition and risk assessment identification.



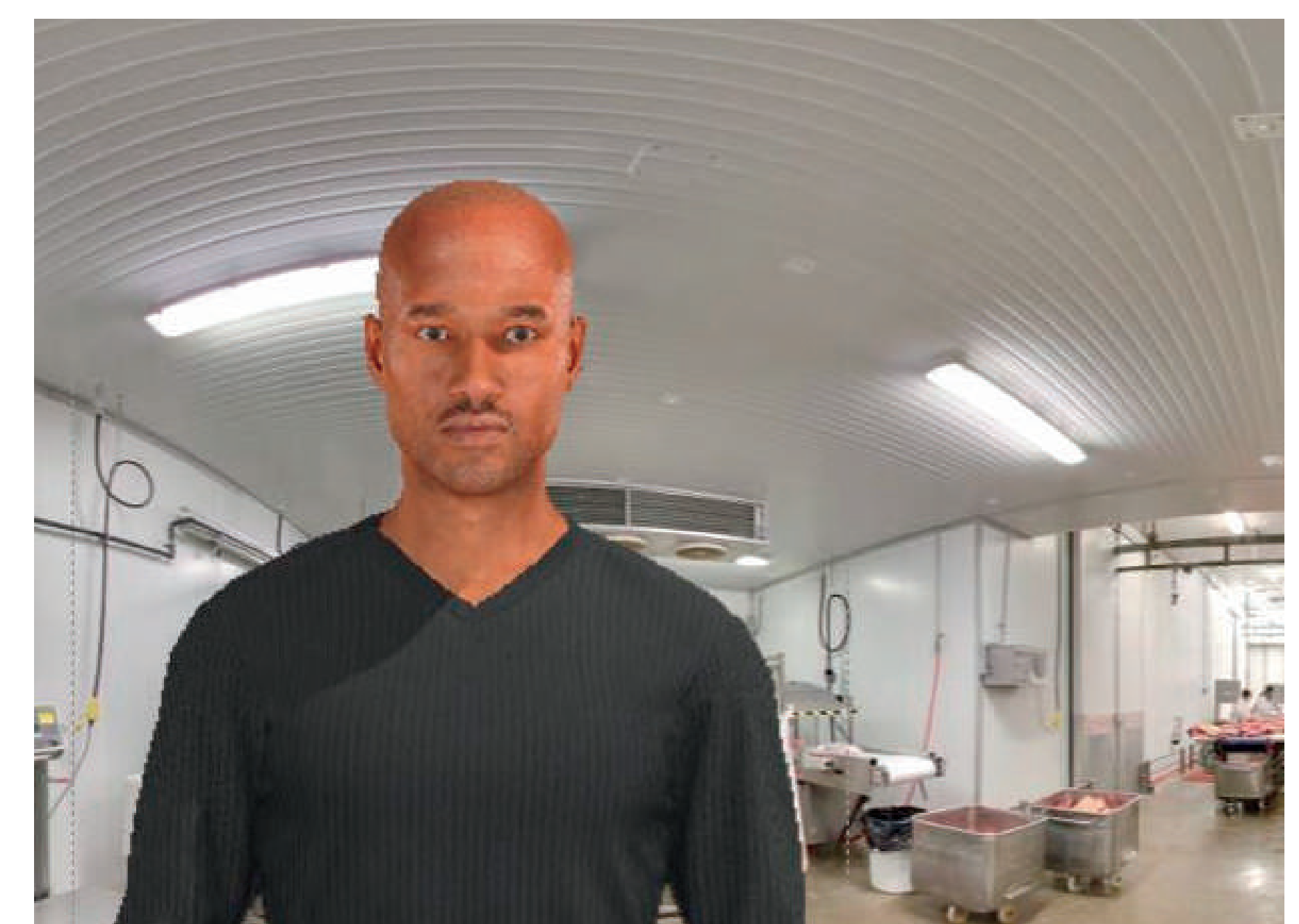
Knowledge retention increased compared to the outcomes of the 10–30-hour standard OSHA in-person training.

OBJECTIVES

- Augment traditional instructor-led employee training sessions in meat processing operations, with digital learning methods that are cost-effective to develop and deploy.
- Document the compliance rates to target behaviours, before and after deployment of the digital training modules, to verify the effectiveness of the training solution.
- Provide a digital environment for trainees to interactively explore, learn, and rehearse the vital activities that support safe practices, while leveraging the experience of subject matter experts during development and deployment.
- Create training modules that are accessible and effective for second language learners, resulting in employee knowledge retention, increased safety, and diminished food contamination.
- Ensure maximum business value for the developed training modules by undertaking close collaboration with industry partners and using pedagogical best practices

ANTICIPATED OUTCOMES

Through adoption of these digital learning modules, it is anticipated that employees will gain a more in-depth understanding of the concepts behind the target behaviors they are being asked to perform. This would result in facilities having an improvement in behavioral compliance and therefore mitigate the risk to food safety (Nichols, 2019).



REFERENCES

- Andulez, V. H., Pazmiño, A. A., Pérez, J. A., Carvajal, C. P., Lozada, F., Lascano, J. & Carvajal, J. (2017). Training of tannery processes through virtual reality, augmented reality and computer graphics. *International Conference on Virtual Reality, Augmented Reality and Computer Graphics* DOI: 10.1007/978-3-319-60922-5_6, 10851, 78-97.
- Doolani, S., Owens, L., Wessels, C. & Makedon, F. (2020). vIS: An Immersive Virtual Storytelling System for Vocational Training. *Applied Sciences*, 10, 8143.
- Eiris, R., Jain, A., Gheisari, M. & Wehle, A. (2020). Safety immersive storytelling using narrated 360-degree panoramas: A fall hazard training within the electrical trade context. *Safety Science*, 127, 104703.
- Fong, K., Falardeau, J., Rideout, K., Wilcott, L., Fong, D. & Wang, S. (2017). Opinions of provincial food safety specialists on addressing Canadian beef processing risks. *Food Protection Trends*, 37, 316-331.
- Government of Canada (2014). *Hazard Analysis and Critical Control Point (HACCP)*. Ottawa: Canadian Food Inspection Agency.
- Government of Canada (2021). *Improving processing capacity in Ontario's meat and poultry sector*. Ottawa: Government of Canada - Office of the Minister of Agriculture and Agri-Food Canada.
- Moore, H. F. & Gheisari, M. (2019). A review of virtual and mixed reality applications in construction safety literature. *Safety*, 5, 51.
- Nichols, M. R. (2019). How will AR and VR improve safety in the food industry? *Food Safety Tech*. <https://foodsafetytech.com/column/how-will-ar-and-vr-improve-safety-in-the-food-industry/>
- Pedram, S., Palimisarno, S., Skarbez, R., Perez, P. & Farrelly, M. (2020). Investigating the process of mine rescuers' safety training with immersive virtual reality: A structured equation modelling approach. *Computers and Education*, 153.