DIGITAL SLAUGHTERHOUSE
Training the next generation of the meat industry

Yusta-Berodas N[1*], Wigham E[1], Dadios N[2], Mateus A[2], Contadini F[3], Deza-Cruz I[3]

[1] University of Glasgow, Glasgow, Scotland, United Kingdom.

[2] Royal Veterinary College, London, United Kingdom.

[3] University of Surrey, Surrey, United Kingdom.

*Corresponding author email: noelia.yusta@glasgow.ac.uk

I. INTRODUCTION

Understanding the role of the official veterinarian in the slaughterhouse and general slaughterhouse operation is a required day-one competency for veterinarians in the UK. However, universities worldwide, including those in the UK, face significant challenges in delivering this essential Veterinary Public Health teaching. These challenges are exacerbated by factors such as a lack of suitable slaughterhouse facilities, food business operators' reluctance to admit students due to biosecurity and perceived commercial risk, and health and safety concerns for students visiting industrial and mechanized environments. Even when access is granted, the teaching content is often inconsistent between groups as it relies on the production line's effective operation on a specific day. Students who have not visited a slaughterhouse can be concerned and anxious about their first visit, resulting in more difficulties in achieving the required learning outcomes as each takes time to acclimate to the environment. A unique academic / industry partnership was established to tackle these challenges, bringing together the University of Glasgow, the Royal Veterinary College, the University of Surrey, and a technology development partner, Denova. This consortium and five meat industry collaborators aimed to design and build a technical resource that complimented live slaughterhouse visits. The objectives were to first prepare students for their visit, reduce concerns and anxieties where possible, and secondly, support veterinary public health students in achieving the Royal College of Veterinary Surgeons (RCVS).

II. MATERIALS AND METHODS

Images, video, and audio from five slaughterhouse facilities, including bovine, porcine, poultry, ovine, and deer, were captured. This multimedia was combined with teaching content carefully curated and provided by six experts in veterinary public health. The teaching content, including streamed videos, was delivered as a browser-based eLearning WebApp, with the 360-degree videos being presented in Virtual Reality(VR), giving the students an immersive introduction to the slaughterhouse environment. The video in the slaughterhouses was filmed during its routine operations with a 360-degree stereo Vuze+ camera. The camera allowed the simultaneous capture of 4K video with both left and right eye views in a full 360 circle and surrounding audio through its 8 lenses and 4 microphones, respectively. When video from this camera is replayed on a VR headset, it allows the user to look in all directions with both left and right eye views, giving the user 3D views of the slaughterhouse. The Digital Slaughterhouse (DS) was built to be a Sharable Content Object Reference Model (SCORM) compatible with Learning Management Systems (LMS), enabling hosting either by individual universities or as a subscription service on a centrally hosted LMS. High-definition 2D video and images were captured to enhance the teaching content. Faces of personnel and other identifiable traits were detected and blurred automatically using the Blace software tool. The DS's knowledge transfer component was developed using the eLearning tool Adobe Captivate and is structured around a tour of the facility.

III. RESULTS AND DISCUSSION

The Digital Slaughterhouse has been well received by students and teaching staff; it complements live visits, provides consistent teaching content, and supports the development of day-one competencies set by the European Association of Establishments for Veterinary Education and the

RCVS. The principles of desensitization, which involve gradually exposing individuals to anxiety-inducing stimuli in a controlled manner, have been well-established in psychology. Virtual simulations can be a valuable tool for implementing desensitization techniques by allowing individuals to experience and confront anxiety-provoking situations in a safe and controlled environment (1). For example, Kourtesis P. et al.(2) explore virtual reality for teaching training and higher education settings, discussing how VR simulations can provide opportunities to practice in difficult or challenging environments. Research in clinical psychology has demonstrated the efficacy of VR exposure therapy in treating phobias, anxiety disorders, and post-traumatic stress disorder (3). Other studies in various health education backgrounds support the use of VR as a way to recreate a realistic training environment that provides exposure to a challenging experience in a controlled environment (4, 5, 6,). Multiple pieces of evidence illustrate the effective design of multimedia learning material, emphasizing the importance of presenting information in multiple formats to cater to diverse learning styles and optimize learning outcomes (7,8,9).

Regarding limitations, virtual reality hardware, such as headsets and controllers, can be expensive, making it challenging for educational institutions with limited budgets to afford VR equipment. This cost barrier may prevent the widespread adoption of VR technology in some schools. Newer headsets are becoming more affordable. In addition, while VR can potentially enhance learning experiences, integrating VR into the curriculum effectively requires training and support for teachers. Lastly, during the VR experiences, motion sickness is common for users who are sensitive to virtual motion or have a pre-existing vestibular issue.

IV. CONCLUSION

The DS generated in this project can play an essential role in helping the students understand slaughterhouse practices. This VR aims to prepare the students mentally in a controlled environment to allow them to function better when facing the actual experience. The eLearning WebApp also enables them to learn, reflect, and/or review food safety and animal welfare concepts. Future steps could include adding some interaction in the VR environment to increase engagement, discovering ways to increase the usefulness of VR in the meat production industry, and determining the full effectiveness of how effective the use of the DS in education.

V. REFERENCES

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