Student Assessments of Virtual Reality Equine Curricula: Results from COVID-19 Induced Cyber Instruction

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Introduction and Theoretical Framework

Research and evaluation are essential to better comprehend the outcomes of virtual instruction on student learning (Lindner et al., 2020). The sudden shift to pervasive virtual learning due to the pandemic necessitates the assessment of student learning from quickly adopted digital technologies (O'Neill et al., 2021). Fussell and Truong (2021) indicated virtual reality (VR) technologies are being included into courses to develop students in safe and organized scenarios for post-graduate success in complex circumstances. VR research is needed to explain the optimization of student performance and student experiences with VR with respect to technology's latency (Dzardanova et al., 2021). Virtual instructional technologies can improve student learning and engagement when used correctly (Bumguardner et al., 2014).

Kirkpatrick and Kirkpatrick's (2006) four-level evaluation includes reactions, learning, behavior, and results to assess learning outcomes. Reactions is the extent participants respond positively to the content. Learning indicates the degree participants increased knowledge. Behavior understands how students apply what they learned. Results are the achievement of learning outcomes (Kirkpatrick & Kirkpatrick, 2006, Miller, 2018). The goal of evaluations is to understand the effectiveness or impact a program has produced on the target audience (Strong et al., 2021). The advantage of the four-level model is the focus on students' feedback, measuring learning improvements, and impact of program outcomes (Chen et al., 2021; Irby et al., 2012).

The technology acceptance model (TAM) identifies attributes predicting an individual's adoption of technology (Davis, 1989; Irby & Strong, 2015). TAM involves two key attributes for examination. Perceived usefulness explains user's belief the extent the technology will enhance their respective performance. Perceived ease-of-use outlines individual's certainty of the effort it takes to adopt the technology (Davis, 1989; Strong et al., 2013).

Purpose and Objectives

The purpose was to assess student learning from VR acceptance through the four-levels evaluation model. Participants were enrolled in an equine selection course and the VR lesson was Horse Judging – Stock type Halter and Western Pleasure Classes. The objectives were:

1. Assess student's learning outcomes from VR use.

2. Analyze student's VR ease-of-use in horse judging.

3. Discern student's suggestions for improving VR horse judging curricula.

Methods

Twelve (n = 12) out of eighteen (N = 18) total students chose to participate (66.67% response rate) in this study. The researchers employed a mixed-methods research design to answer the study's objectives. Mixed methods permit researchers to tackle multifaceted research objectives, develop responses to both exploratory and confirmatory inquiries within one study, and unveil a more complete depiction of a contextual issue (Ivankova & Wingo, 2018). A mixed-method design incorporates narratives and numerical data (Fraenkel et al. 2019).

Student’s learning objective was to understand and apply guidelines for judging Halter and Western Pleasure equine classes. The Tailored Design Method (Dillman et al., 2014) is the foremost data collection strategy to gather participant electronic data. A Qualtrics instrument including the Attitudes toward Virtual Reality Technology Scale (AVRTS) (Bunz et al., 2020) was used to assess attitudes. Qualitative responses were assessed for trustworthiness and credibility as recommended by Dooley (2007). The researchers implemented the TDM to collect data and develop themes based on Braun and Clarke’s (2006) recommendations. Nonparametric statistics were used to examine quantitative data and answer the first and second objectives (Fraenkel et al., 2019).

Results

Most respondents (n = 10, 83.33%) somewhat to strongly agreed VR horse judging technology improved their learning. Eleven (n =11, 91.67%) of twelve participants indicated they could apply what I learned from the virtual technology in a horse judging contest. Seven respondents at least somewhat agreed VR taught them to effectively apply standards to judge each horse class. Eight respondents agreed they could apply what they learned from the virtual technology in real life evaluations.

Participants reported diverse attributes of virtual technology’s role in horse judging. R7 included “A benefit would be you have the horses right in front of you whereas in real life they are somewhat farther away.” R6 conveyed virtual reality technology “Provides a more realistic experience compared to watching a recording. It gave you a more realistic look at the horses while teaching you how to keep scanning the class in rail events to simulate a contest scenario.”

The benefit of convenience and not traveling was indicated by participants, R4 added, “Even when you can’t physically go see the horses this allows the judge to get close and have a greater grading.” R1 explained VR benefits further,

> “Using virtual technology allows you to feel more like you are judging horses live. You are able to practice watching all the horses moving at once, like you have to do in a judging contest. It also allows you to practice time management while you look at the horses.”

The third objective centered on student’s feedback to improve the VR curricula. R1 suggested, “I think distance from the camera is important. I felt more nauseous the closer the horses were moving toward the camera.” R6 responded with

> “I would suggest for the halter classes, the horses should be further away from the camera, so you can get a better idea of how you would like to place the class. They should also be set in a line like they are in a judging contest so you have to walk down the line of horses to evaluate them. For the Western Pleasure class, maybe the footage could be filmed in a bigger space as well, instead of a round pen.”

Recommendations and Educational Importance

International agricultural educators’ assessment of ubiquitous virtual instructional technologies will be necessary long after the pandemic is over. Across the world, the pandemic still wreaks havoc on student learning as the new normal of education has evolved. Global agricultural educators should discern the extent VR instructional technologies may be applicable for digital delivery to meet their learning objectives (Klerkx et al., 2021). VR technology will continue to progress and the technology's ability to offer digital simulations are beneficial in increasing knowledge in large global issues such as climate change, food security, and public health.

References

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Bumguardner, K. M., Strong, R., Murphrey, T. P., & Dooley, L. M. (2014). Examining the blogging habits of agricultural leadership students: Understanding motivation, use, and self-efficacy. *Journal of Agricultural Education, 55*(3), 32–42. https://doi.org/10.5032/jae.2014.03032

Bunz, U., Seibert, J., & Hendrickse, J. (2020). From TAM to AVRTS: Development and validation of the attitudes toward Virtual Reality Technology Scale. *Virtual Reality, 24*, 583–603. https://doi.org/10.1007/s10055-020-00437-7

Chen, H. T., Morosanu, L., Bellury, L. M., Teleaga, J., & Hardin, A. E. (2021). Proactive evaluation: The program stress test. *American Journal of Evaluation, 42*(2), 293–303. https://doi.org/10.1177/1098214020951258

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th ed). John Wiley & Sons, Inc.

Dzardanova, E., Kasapakis, V., Gavalas, D., Sylaiou, S. (2021). Virtual reality as a communication medium: a comparative study of forced compliance in virtual reality versus physical world. *Virtual Reality*. https://doi.org/10.1007/s10055-021-00564-9

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill

Fussell, S. G., & Truong, D. (2021). Using virtual reality for dynamic learning: an extended technology acceptance model. *Virtual Reality*. https://doi.org/10.1007/s10055-021-00554-x

Irby, T. L., & Strong, R. (2015). Instructional competencies needed to develop instructional strategies for mobile learning in fields of agricultural education. *The Quarterly Review of Distance Education, 16*(3), 77–81.

Irby, T. L., Wynn, J. T., & Strong, R. (2012). A descriptive evaluation of agricultural education eLearning courses: Students' perspectives. *NACTA Journal, 56*(3), 70–76. https://www.jstor.org/stable/nactajournal.56.3.70

Ivankova, N., & Wingo, N. (2018). Applying mixed methods in action research: Methodological potentials and advantages. *American Behavioral Scientist, 62*(7) 978–997. https://doi.org/10.1177/0002764218772673

Klerkx, L. (2021). Digital and virtual spaces as sites of extension and advisory services research: Social media, gaming, and digitally integrated and augmented advice. *The Journal of Agricultural Education and Extension, 27*(3), 277–286. https://doi.org/10.1080/1389224X.2021.1934998

Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006). *Evaluating training programs: The four-levels* (3rd ed.). Berrett-Koehler.

Lindner, J., Clemons, C., Thoron, A., & Lindner, N. (2020). Remote instruction and distance education: A response to COVID-19. *Advancements in Agricultural Development, 1*(2), 53–64. https://doi.org/10.37433/aad.v1i2.39

Miller, B. J. (2018). Utilizing the Kirkpatrick Model to Evaluate a Collegiate High-Impact Leadership Development Program. Master's thesis, Texas A & M University. https://hdl.handle.net/1969.1/173373

O'Neill, K., Lopes, N., Nesbit, J., Reinhardt, S., & Jayasundera, K. (2021). Modeling undergraduates' selection of course modality: A large sample, multi-discipline study. *The Internet and Higher Education, 48*, 1–11. https://doi.org/10.1016/j.iheduc.2020.100776

Robinson, O. C. (2014). Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative Research in Psychology, 11*(1), 25–41. https://doi.org/10.1080/14780887.2013.801543

Strong, R., Dooley, K., Murphrey, T., Strong, J., Elbert, C., & Baker, M. (2021). The EVAL framework: Developing impact evaluation scholars. *Advancements in Agricultural Development, 2*(3), 1–13. https://doi.org/10.37433/aad.v2i3.139

Strong, R., & Irby, T. L., & Dooley, L. M. (2013). Factors influencing students' behavioral intentions: Examining the potential use of mobile technology in agricultural education courses. *Journal of Agricultural Education, 54*(4), 149–161. https://doi.org/10.5032/jae.2013.04149