

Exploring Student Perceptions of an Interactive Virtual Tour of an Agricultural Facility

Kylie Harlan¹
Courtney Meyers²
Laura M. Fischer³
Lindsay Kennedy⁴

Abstract

Over the past three decades, virtual tours have been used in many contexts. In educational settings, virtual tours have been used to replace on-site field trips, which can be difficult to execute due to a variety of logistical concerns. While virtual tours are widely used, there is limited research pertaining to their use in food and agricultural industry locations. To address this gap and gather student input, this research explored students' perspectives of virtual tours in an agricultural educational context. Specifically, this study sought to explore learners' perceptions of a virtual tour to learn about the cotton ginning process. Guided by the Technology Acceptance Model (TAM), the research employed a convergent parallel mixed methods design. Student scores were collected quantitatively on four TAM constructs, while qualitative insights from focus group discussions were collected to elucidate the quantitative data. Results indicated positive student perceptions of IVTs as learning tools but emphasized their inability to fully replace traditional field trips. Participants found it easy to navigate the virtual tour and appreciated the variety of content types – videos, photos, and text. They suggested additional agricultural contexts where virtual tours would be informative. These findings contribute valuable insights for researchers exploring IVT usage in agricultural education and provide guidance for virtual tour creators, informed by student feedback. Additional research should collect insights from instructors regarding the use of these educational tours in their courses.

Introduction

Field trips are a common way for educators to provide students of all ages with hands-on, interactive learning experiences. As an experiential learning opportunity, field trips take students to locations and give them experiences that typically cannot be replicated in a classroom setting (Behrendt & Franklin, 2014). Experiential learning is “authentic, first-hand, sensory-based learning” (Behrendt & Franklin, 2014, p. 237). This type of learning can help participants increase their knowledge, develop skills,

Note: This work was supported by the National Institute of Food and Agriculture and the U.S. Department of Agriculture, under award number 2021-70003-35432.

Kylie Harlan¹ is a Lecturer of Agricultural Communications in the Department of Agricultural Education and Communications at Texas Tech University, Box 42131 15th St. Lubbock, Texas 79409; kylie.harlan@ttu.edu. <https://orcid.org/0009-0006-0892-1797>

Courtney Meyers² is a Professor of Agricultural Communications in the Department of Agricultural Education and Communications at Texas Tech University, Box 42131 15th St. Lubbock, Texas 79409; courtney.meyers@ttu.edu. <https://orcid.org/0000-0001-9099-3613>

Laura M. Fischer³ is an Associate Professor of Agricultural Communications in the Department of Agricultural Education and Communications at Texas Tech University, Box 42131 15th St. Lubbock, Texas 79409; laura.fischer@ttu.edu. <https://orcid.org/0000-0001-9288-4621>

Lindsay Kennedy⁴ is an Associate Professor of Practice of Agricultural Communications in the Department of Agricultural Education and Communications at Texas Tech University, Box 42131 15th St. Lubbock, Texas 79409; lindsay.kennedy@ttu.edu. <https://orcid.org/0000-0003-3210-0084>

and clarify personal values (Association for Experiential Education, 2023). Field trips have been used in a variety of disciplines in both K-12 and higher education settings, such as language and writing (Rugaiyah, 2022; Alcântara, 2016), tourism (Arcodia et al., 2021), sociology (Wright, 2000), agricultural communications (Partyka et al., 2019), and science, technology, engineering, and math subjects (STEM) (Knapp, 2000; Lei, 2010).

In a STEM context, instructors said field trips were a good supplement to teaching in a classroom or laboratory and recognized field trips as a way to reinforce the material taught in traditional learning environments (Lei, 2010). Students said field trips “make learning more enjoyable and interesting” and also appreciated the opportunity for “learning through active participation (hands-on experience)” that field trips often provide (Lei, 2010, p. 44).

While these trips are valuable learning opportunities, they can be difficult to execute due to the physical location as well as financial, safety, and other logistical concerns (Cassady et al., 2008; Han, 2020). To overcome these challenges, virtual tours—along with electronic, online, and virtual field trip options—can be used as an alternative. These types of field trips and tours seek to simulate the traditional field trip experience through a variety of interactive features (Hosticka et al., 2002). An interactive virtual tour (IVT) combines various multimedia content types with cutting edge 3-D spatial technology. They also often include curriculum and other supplemental materials to encourage the integration of these tours in educational settings (Mead et al., 2019).

Although prior literature regarding IVT use is limited, virtual tours have been used in food and agricultural science education contexts (Herritsch et al., 2013; Karcher & Reid, 2018). In an undergraduate chemical engineering course, a group of students explored an IVT of a milk powder plant (Herritsch et al., 2013). To assess the usefulness of the IVT, students in the course were split into two groups: those who toured the IVT and those who received the information presented in the IVT in a written document. After a week of studying their respective materials, both groups of students were administered the same test. Students who received the IVT scored better on the test and spent less time studying than the other group of students. While students said the IVT could not completely replace the social (e.g., fun factor, hanging out with friends) and real-world (e.g., smell, noise, dust) aspects of a traditional field trip, they acknowledged the IVT was a good substitute if the site was not able to be visited in person. In a dairy management course, Karcher and Reid (2018) assessed undergraduate students’ perceptions of using virtual farm tours in the classroom. Students were able to explore three dairy farms through virtual tours. After each tour, students completed a questionnaire to evaluate their perceptions of the experience. Near the end of the semester, they went on an on-site tour of a dairy and completed a similar questionnaire. They found students viewed virtual farm tours as a beneficial addition to their learning experience and student scores on the virtual farm tour and live farm tour evaluation assignments were similar (Karcher & Reid, 2018). With the increasing availability and application of virtual tour technology in educational settings, further research is needed to investigate students' perspectives on this innovative teaching approach.

Theoretical Framework

The Technology Acceptance Model was used to guide this study. Davis (1985) created the Technology Acceptance Model (TAM) in an effort to measure one’s intention to adopt various technologies. The widely used Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) are recognized as foundational pieces in the creation of the TAM (Marangunić & Granić, 2014). Davis (1985) adapted these theories to develop a model that could better predict the use of specific technologies (Marangunić & Granić, 2014). TAM has been applied in a variety of contexts but is most often used in information systems and technology research.

Since its inception, the model has been revised and adapted to fit a multitude of situations. Originally, Davis (1985) postulated that a person's attitude toward a technology was impacted by only two factors: perceived usefulness and perceived ease of use. Perceived usefulness relates to a system enhancing an individual's job performance and perceived ease of use concerns whether an individual views using a certain system as effort free or not (Davis, 1985). In this original model, actual usage is determined by behavioral intention, which is affected by one's attitude and perceived usefulness of a system (Davis, 1989).

Through further research, Davis discovered that attitude did not fully explain the relationship of perceived usefulness, perceived ease of use, and behavioral intention (Davis, 1989). Thus, a simplified version of TAM was proposed that removed attitude from the model and included three constructs: behavioral intention, perceived usefulness, and perceived ease of use. An additional construct was found to be significant in predicting an individual's usage. Perceived enjoyment relates to how enjoyable a user finds the technology usage experience, despite any performance issues that may be encountered (Davis et al., 1992). Davis et al. (1992) found that the combination of perceived usefulness and perceived enjoyment mediated the effects of perceived ease of use and output quality on intention. Essentially, one's intention to use a new technology is preceded by perceived usefulness and perceived enjoyment. Additionally, perceived usefulness and perceived enjoyment are influenced by perceived ease of use (El-Said & Aziz, 2021). While the factor of perceived enjoyment is not always included in TAM, in virtual contexts, enjoyment is thought to play an important role in predicting users' intention to adopt IT applications in virtual environments (El-Said & Aziz, 2021).

Purpose and Research Questions

The purpose of this research was to explore students' perspectives of virtual tours in an agricultural educational context. Specifically, this study sought to explore learners' perceptions of a virtual tour to learn about the cotton ginning process. This mixed methods study was guided by five research questions. Research question one sought to address the quantitative data that were collected and research questions two through five addressed the qualitative findings.

Quantitative Research Question

RQ1: How did participants assess the virtual tour's usefulness, enjoyment, ease of use, and intention for future use?

Qualitative Research Questions

RQ2: What was the perceived educational merit of the virtual tour experience?

RQ3: What types of content and subject matter did participants enjoy most?

RQ4: How did participants describe the virtual tour's ease of use?

RQ5: What suggestions did participants provide regarding the development of virtual tours about agriculture and food science facilities?

Methods/Procedures

This study utilized a convergent parallel mixed methods research design. In this approach, quantitative and qualitative data are collected in a single study, either concurrently or sequentially, given a priority, analyzed separately, and then brought together for comparison and interpretation (Creswell & Plano Clark, 2011). The theoretical framework informed the study's research questions, the items included in the quantitative questionnaire, and the key questions asked during the focus group sessions. This allowed for quantitative data and qualitative findings to be related, compared, and discussed after data analysis.

Instrument Development

The instrumentation for this study was an online Qualtrics questionnaire and a moderator guide to facilitate focus group discussions. The Qualtrics instrument contained 12 Likert-type scale statements to measure participants' perspectives about the virtual tour experience. It also had eight demographic questions and two questions regarding participants' connection to agriculture. The moderator guide included semi-structured interview questions as well as a detailed script of instructions for the research session. The guide began with an introduction and description of how the research session would flow, and instructions on how to access the Qualtrics instrument, which contained the link to the stimulus and the questionnaire. After participants had explored the tour and completed the questionnaire, the moderator guide shifted to focus on the focus group discussion. A brief explanation of what a focus group is, how it functions, and the role of a moderator and notetaker were provided prior to the question portion of the discussion. The semi-structured interview guide included an introduction prompt for participants, five open-ended questions, and a final question that summarized the discussion and asked for additional comments. These questions were crafted so they would address the previously stated research questions, as well as connect to the four Technology Acceptance Model constructs that were included in the quantitative instrument. This study also aimed to collect user feedback and suggestions for enhancing current and future IVTs, which was addressed through the fifth open-ended question.

To aid in creating the questionnaire and moderator guide, we adapted a portion of El-Said and Aziz's (2021) instrument pertaining to TAM and tailored it to fit the needs of the study. To establish face validity, this adapted instrument was reviewed by a panel of experts with expertise in survey instrument design, agricultural communications, and agricultural education. This panel also assessed content validity to ensure the questions addressed all aspects of the TAM constructs. This review process refined the questions to make them relevant to the context of the cotton gin interactive virtual tour. Following data collection, we conducted post hoc reliability for the adapted items in the four TAM constructs. The Cronbach's alpha for each of the constructs is as follows: Perceived Usefulness $\alpha = .67$; Perceived Enjoyment $\alpha = .79$; Perceived Ease of Use $\alpha = .78$; and Intention to adopt VTs was $\alpha = .80$. Prior literature states that an alpha between .60 and .80 is acceptable (Hair et al., 2019; Hajjar, 2018; Saeed & Kassim, 2017) especially in instances of exploratory research and preliminary instrument development (Peterson, 1994). Additionally, a pilot study was conducted with seven graduate students in the Department of Agricultural Education and Communications at Texas Tech University to test the instruments and stimulus. They provided suggestions on the flow of the session and moderator guide, which were implemented prior to data collection. They did not have any revisions to the Qualtrics questionnaire.

To address concerns of reliability and validity in qualitative research, the measure of trustworthiness is used. Lincoln and Guba (1985) identified four criteria needed to establish trustworthiness in a qualitative study: credibility, transferability, dependability, and confirmability. Credibility was established through triangulation of multiple data sources, including the questionnaire, focus group transcripts, participant notes, and field notes (Creswell & Miller, 2000). Credibility was strengthened through conducting member checks at the end of each focus group and peer debriefing with the notetaker at the conclusion each focus group (Creswell & Miller, 2000; Shenton, 2004). To support transferability, the study used thick, rich descriptions of the study's context and findings (Connelly, 2016). Dependability was achieved by keeping a detailed audit trail throughout the research, and confirmability was reached through the audit trail, triangulation of data sources, and peer review of the analysis process (Thomas & Magilvy, 2011).

When conducting research then drawing conclusions based on the results, researchers must be reflexive. According to Creswell (2013), for researchers to exhibit reflexivity, they must be aware of the potential biases, values, and experiences they bring to their research and how these factors can impact findings and conclusions. Based upon this, it is important to acknowledge these external elements and how they may affect the research. At the time of data collection, three members of the research team were part

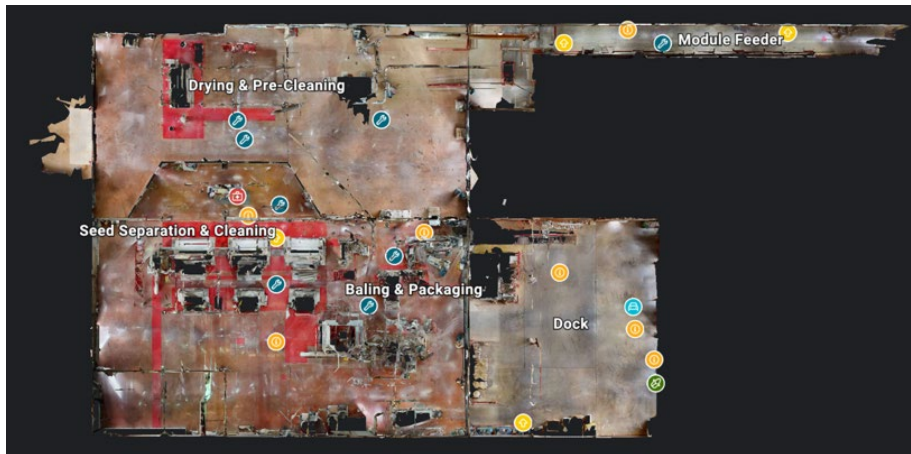
of the iVisit grant project, which supported the stimulus development. The IVT used as the stimulus in this study was created by iVisit project members to meet the grant's objectives. To minimize researcher bias, we maintained an open mind throughout data collection and invited a researcher outside of the grant team to provide expertise regarding this study's methodology, data analysis, and summary of results.

Data Collection

All participants were exposed to the same stimulus, an IVT of a cotton gin. This IVT was created as a part of a grant project, The iVisit Project. The IVT contained "stops," which are markers within the tour that provide information about the cotton ginning process (Figure 1). This tour incorporated different multimedia aspects to walk viewers through the cotton gin. Videos were used to explain the most important parts of the ginning process while photos and plain-text descriptions were used to enhance video content, provide further detail, and address items that did not have explainer videos. The markers were color-coded by subject type and also have icons representative of the type of subject covered in the stop. For example, content pertaining to equipment are marked with a wrench icon. This tour contained 22 stops: video stops are green, photo stops are red, plain-text description stops are blue, and yellow markers act as directional guides. Participants were given a demonstration of the different ways to navigate the tour prior to their viewing. Students were given 15 minutes to navigate the tour.

Figure 1

Screenshot of the floorplan view of the cotton gin interactive virtual tour.



The target population for this study were undergraduate students at Texas Tech University in the Davis College of Agriculture and Natural Resources. The participants were a convenience sample of students who chose to attend the focus group sessions ($N = 32$). It should be noted that participants may have had a pre-existing interest in virtual tours. Additionally, students were entered in a drawing to win one of four \$25 cash prizes for participating. Selecting an appropriate sample size and number of interviews in qualitative research can be challenging due to the varying characteristics between studies; however, data saturation can be used as a guiding principle for guaranteeing qualitative rigor (Hennink et al., 2019). "Data saturation refers to the point in data collection when issues begin to be repeated and further data collection becomes redundant" (Hennink et al., 2019, p. 1483). After each focus group, researchers identified common themes. By the fourth focus group, no new themes occurred. While there is limited research on exact methods for assessing data saturation (Hennink et al., 2019), prior literature has found that two to three focus groups typically capture 80% of themes, including the most prevalent ones, and three to six groups account for 90% of themes in homogenous populations using a semi-structured discussion guide (Guest et al., 2017). While five to eight participants have traditionally been considered the ideal size for a focus

group, smaller, or mini-focus groups, are becoming more popular. These focus groups have four to six participants, and are considered easier to recruit for, host, and are more comfortable for participants (Krueger & Casey, 2014). With these considerations in mind, six focus group discussions were held with four to eight participants in each session, resulting in 32 total focus group participants. Due to the sampling approach and small sample size, this research is not generalizable to a larger population. However, the insights gained are transferable to similar participants and other IVTs related to food and agricultural science (FAS) facilities.

Data Analysis

Quantitative data were originally collected in Qualtrics then exported into IBM SPSS v. 29. Descriptive statistics were calculated for participants' demographics, connection to agriculture, and the TAM scale items. Qualitative data were collected by recording the focus group discussion using Otter.ai. Each transcript was then verified for accuracy and personal identifiers were removed and replaced with participant numbers. Using DelveQDA, the data were analyzed using open, axial, and selective coding methods (Williams & Moser, 2019).

Population and Sample

The descriptive characteristics of participants can be found in Table 1. Most participants ($n = 23$, 71.9%) identified as female. All participants identified as Caucasian ($n = 32$), and two participants also identified as American Indian, Native American, or Alaska Native ($n = 2$, 6.3%). The majority ($n = 20$, 62.5%) were classified as seniors by credit hours. All participants were enrolled in the Davis College of Agriculture and Natural Resources at Texas Tech University ($n = 32$, 100%), and agricultural communications was the most common major ($n = 29$, 90.6%).

Table 1

Demographic Characteristics of Participants (N = 32)

Characteristic	<i>n</i>	%
Gender		
Female	23	71.9
Male	9	28.1
Non-binary / Third Gender	0	0.0
Prefer not to say	0	0.0
Spanish, Hispanic, and Latino Origin		
No	31	96.9
Yes	1	3.1
Ethnicity		
Caucasian	32	100.0
American Indian/Native American or Alaska Native	2	6.3
Black or African American	0	0.0
Asian	0	0.0
Native Hawaiian or Other Pacific Islander	0	0.0
Other	0	0.0
Classification by Credit Hour		
Senior (90+ hours)	20	62.5
Junior (60-89 hours)	6	18.8
First-year (0-29 hours)	4	12.5

Sophomore (30-59 hours)	2	6.3
College of Enrollment		
Davis College of Agriculture and Natural Resources	32	100.0
Academic Major		
Agricultural Communications	29	90.6
Agricultural Education (Teacher Certification)	2	6.3
Animal Science (Science)	1	3.1

Participants' connection to agriculture was determined through two questions: rural-urban hometown classification and prior exposure to cotton gins. Half of the participants ($n = 16$, 50%) classified their hometown as a farm in a rural area. Other participants' hometown classifications were as follows: subdivision in a town or city ($n = 7$, 21.9%), urban or suburban area outside of the city limits ($n = 5$, 15.6%), and rural area, not a farm ($n = 4$, 12.5%). Regarding prior exposure, 16 participants (50%) selected they had previously visited a cotton gin in person, and 15 participants selected they had not visited a cotton gin before. One participant selected "not sure."

Findings

Quantitative Research Question

The first research question sought to describe how participants assessed the virtual tour's usefulness, enjoyment, ease of use, and intention for future use. Each TAM construct consisted of three Likert-type statements where 1 = *strongly disagree* and 5 = *strongly agree*. The upper limit for each scale was 5.00 and each construct's grand mean was a 4.00 or greater. In Table 2, we provide the means and standard deviations for each Likert scale item as well as the grand means for each construct and their reliability coefficient (Field, 2024).

Table 2

Means, Standard Deviations, and Cronbach's Alpha for TAM Constructs and Scale Items (N = 32)

Constructs and Items	<i>M</i>	<i>SD</i>	α
PU: Perceived Usefulness			.67
PU1: Experiencing the virtual tour increased my knowledge about the cotton gin.	4.66	.83	
PU2: In my opinion, virtual tours are a useful way of experiencing cotton gins.	4.59	.67	
PU3: The virtual tour was a convenient way to visit the cotton gin.	4.47	.72	
PU Grand Mean	4.57	.58	
ENJ: Perceived Enjoyment			.78
ENJ1: I enjoyed experiencing the virtual tour.	4.41	.77	
ENJ2: I would describe the virtual tour experience as very interesting.	4.38	.83	
ENJ3: The virtual tour experience was fun.	4.00	.92	
ENJ Grand Mean	4.26	.70	
PEOU: Perceived Ease of Use			.78

PEOU1: It was easy for me to understand how to experience the virtual tour.	4.53	.62	
PEOU2: I found that the virtual tour experience was flexible to interact with.	4.34	.83	
PEOU3: It was easy for me to become skillful at experiencing the virtual tour.	4.31	1.03	
PEOU Grand Mean	4.40	.70	
INT: Intention to Adopt IVTs			.80
INT1: The virtual tour stimulated my interest to experience other virtual tours in the future.	4.22	.83	
INT2: I intend to experience other virtual tour sites in the future.	4.19	.78	
INT3: I will consider visiting some other agricultural sites virtually.	3.59	.88	
INT Grand Mean	4.00	.70	

Note: Scores were based on a Likert-type scale with 1 = *strongly disagree* and 5 = *strongly agree*.

Qualitative Research Questions

Questions two through five sought to describe the qualitative insights gained through the focus group discussions. Table 3 summarizes the emergent themes for the research questions. Themes were developed using open, axial, and selective coding methods, and are supported by participant statements (Williams & Moser, 2019).

Table 3

Summary of Emergent Themes, Organized by Research Question

Research Question	Emergent Themes
RQ2: What was the perceived educational merit of the virtual tour experience?	<ol style="list-style-type: none"> 1. IVTs Have a Place Inside of the Classroom 2. IVTs vs. Traditional Field Trips 3. Using IVTs in an Informal Setting
RQ3: What types of content and content matter did participants enjoy most?	<ol style="list-style-type: none"> 1. Variety is Appreciated, but Videos are Elite 2. Quick Facts are Best
RQ4: How did participants describe the virtual tour’s ease of use?	<ol style="list-style-type: none"> 1. Multiple Ways to Navigate the Tour 2. “Go at Your Own Pace” 3. It’s Easy! 4. Getting the Hang of It
RQ5: What suggestions did participants provide regarding the development and improvement of virtual tours about agriculture and food science facilities?	<ol style="list-style-type: none"> 1. “Showcasing Any Process Within Agriculture” 2. Improving Clarity

Findings related to each research question are presented through the description of emergent themes. Themes are supported with narrative statements from participants. To ensure participant confidentiality, participant names were replaced with participant numbers.

Research Question Two

This research question addressed how participants viewed using virtual tours in an educational context. Three emergent themes were found with some corresponding subthemes.

IVTs Have a Place Inside of the Classroom

Participants agreed that IVTs could be used inside of the classroom in a variety of ways. They mentioned it was more engaging than a typical lecture, appealed to a variety of learning types, could spark class discussions, or be integrated in an assignment context. Participant 17 said, “This is for sure an effective learning tool and there’s no doubt about that... I definitely think this could be a really awesome discussion board tool or maybe just a ‘what facts did you take away from this’ assignment.”

Additionally, participants noted that information is also shared through a variety of formats, making the IVT appealing to a variety of learning types. Participant 28 said:

What I think is nice about it is it appeals to many different learning types because it appeals to your visual learners. And it also will appeal to your auditory learners, but also your learners who learn by interacting. So, I feel like it would be beneficial in a classroom setting to appeal to a variety of learning types.

IVTs vs. Traditional Field Trips

While participants did not say IVTs could entirely replace field trips, they recognized the benefits IVTs provide as well as different ways to use IVTs. The emergent subthemes were: (1) IVTs Provide Flexibility, (2) IVTs are Great, but They’re Not a Replacement, (3) IVTs as Supplements to Field Trips.

IVTs Provide Flexibility. Participants recognized the obstacles that often come with taking traditional field trips and said IVTs could be a great alternative. Participant 9 said:

You can do it from wherever. If you’re at home, you’re at school, you’re at the coffee shop, you can sit there and do it. It’s convenient—you don’t have to go out to the gin to just go tour it.

IVTs are Great, but They’re Not A Replacement. Participants indicated they enjoyed the IVT but noted it was not a replacement for an actual field trip. Many of them wanted to be able to walk around inside of the actual facility. Participants who had toured a gin in person before said it was harder to take information from the IVT because of their prior experiences. Participant 4 said, “The virtual tour was harder for me to obtain information having done a tour with a gin in person. I didn’t obtain as much virtually.” Participant 1 said, “I feel like nothing can compare to in-person tours, but I feel like this did a really good job of making it realistic.

IVTs as Supplements to Field Trips. While IVTs may not be a replacement for in-person field trips, participants said they could be a valuable supplement. Participants mentioned the IVT could be explored prior to students taking an actual tour to inform them about the location or after a tour as a reference material. Participant 1 said:

Virtual tours like this one could be used in the classroom setting if you were taking your class on a tour. Maybe give them this virtual tour ahead of time, so they can think of those questions. Because we all know it can get awkward whenever they’re like ‘Are there any questions?’ and nobody asks.

Using IVTs in an Informal Setting

Participants perceived IVTs as having educational merit not only inside of the classroom but also to educate beyond the classroom setting with people from diverse backgrounds. Participants recognized the value of “bridging the gap” between the agricultural industry and consumers as well as identified this as a potential tool to assist in those efforts. Participant 1 said, “As an agriculturist, there’s always controversy

on why is the outside world not understanding what we're doing in agriculture... So, I liked this aspect of not telling them but actually showing them what goes on in agriculture."

Research Question Three

Research question three sought to understand participants' preferences, if any, for differing types of content (e.g., videos, photos, descriptions) as well as the subject matter they enjoyed most. From this, two main themes emerged: (1) Variety is Appreciated, but Videos are Elite, and (2) Quick Facts Win. These two themes also had subthemes that are discussed below.

Variety is Appreciated, but Videos are Elite

Participants made many comments, critiques, and suggestions regarding how the information within the tour was presented. Based on participant feedback, it is clear that while participants did enjoy an assortment of content delivery methods, they preferred videos. This led to the development of the following subthemes: (1) Include a Variety of Content Types and (2) (Short) Videos are the Favored Content Type.

Include a Variety of Content Types. Many participants mentioned they enjoyed the varying ways content was presented. The tour of the cotton gin included five video stops, six photo stops, and 11 text-only description stops. Participants said the combination of delivery methods helped them stay interested and appealed to a variety of learning styles. Participant 17 said, "I also liked that there was a lot of transitioning between a video here and then a picture here with a scenario. I liked that it always kept you guessing like what was next."

(Short) Videos are the Favored Content Type. While participants appreciated the variety of content types, it was apparent videos were the preferred content type. Participants mentioned videos helped to keep them engaged throughout the tour and they made it easier to understand the information. The majority of participants also mentioned they enjoyed how short the videos were. The five videos ranged from 34 seconds to 50 seconds in length. Participant 19 said, "The videos were my favorite part of the experience because they're short, they give you a whole lot of information really quick and effectively. It's honestly easier to retain the reading."

Quick Facts are Best

Beyond how the content was presented, participants also noted the content they remembered from the tour and were asked to describe why they recalled the information. Participants noted "quick facts" were what they picked up on most, with varied reasoning on why this was so. Two subthemes arose from this: (1) Make it Easy to Consume and Interesting, and (2) Quantification Helps.

Make it Easy to Consume and Interesting. During the focus group, participants were asked to recall any facts or bits of information they remembered from the tour and were then asked to explain if there was a particular reason they remembered this information. Participants emphasized making the information presented "easy to consume" or "digest." Additionally, some participants said it was the smaller, more random facts they remembered best, rather than the larger picture items. Participant 20 said, "It's good that the information was pretty digestible. Especially for somebody who has no background in agriculture or a gin."

Quantification Helps. When asked what they remembered, many participants recalled facts that included numbers. Some participants specifically stated numbers helped them to recall facts. Participant 19 said, "It's the quantification of something that helps me remember it. You give me a number and now it feels more important because it is an amount of something."

Research Question Four

The fourth research question sought to understand how participants described the virtual tour's ease of use. Four themes emerged: (1) Multiple Ways to Navigate the Tour, (2) Go at Your Own Pace, (3) It's Easy!, and (4) Getting the Hang of It.

Multiple Ways to Navigate the Tour

Participants recognized there are multiple ways to navigate the tour and uses for the floorplan and dollhouse view tools. Two subthemes emerged from this discussion: (1) Use the Arrows and (2) The Floorplan is Your Friend.

Use the Arrows. At the beginning of the research session, participants were given a demonstration of the different ways to navigate the tour as well as some of the tools that were available to them. There are two basic ways to navigate the tour. The first is to use the arrows to go through all of the stops in the way they were ordered. The second way to navigate was to use a “free look” approach, which is essentially moving throughout the tour with no predefined path. Participant 9 said, “I wasn’t ever confused because I clicked through the arrows, but if I would have just like clicked around then I might have gotten lost and not followed the correct path.”

The Floorplan is Your Friend. One of the tools available to users is the option to view the entire facility from a floorplan view. Participants mentioned this was a helpful aspect to orient themselves in the facility. Participant 14 said, “The floor plan was really helpful; especially how it was labeled because whenever I did get lost, I would go back there and kind of reposition myself.”

Go at Your Own Pace

As the previous theme and subthemes addressed, there are different ways to navigate the tour, and each person had their own preferences to which method is best. Regardless of how users choose to navigate the tour, participants mentioned they liked that they were able to go at their own pace and choose how they experienced the gin. This allowed them to spend more time learning about content that interested them specifically. Participant 10 said:

The ‘go at your own pace’ thing is really nice. Because I mean, in a tour, they’re probably going to be busy. So, they want to get you in and out, and you’re not going to be able to go back either.

It’s Easy!

Participants said they enjoyed how easy it was to move around and explore the cotton gin. As the previous theme discussed, they liked being able to essentially control their trip. They also enjoyed navigating through the tour, for the most part. Participant 11 said, “I found it was smooth and easy to navigate your way around. Having those [numbers], even though the numbers are small, it was helpful to have those up there, so you know which order you were in.”

Getting the Hang of It

While many participants described navigating the tour as “easy,” several participants noted there were times they were lost, or a bit confused, and had to spend some time reorienting themselves. Participant 20 said, “It definitely got easier to navigate once I got further in. At the beginning I was kind of like, ‘OK, it’s a little confusing,’ but I think that might be in part because of how the gin is structured.”

Research Question Five

The final research question sought to identify future tour sites as well as improvements to be made for future tours. This led to the development of two themes with corresponding subthemes.

“Showcasing Any Process Within Agriculture”

Participants identified a variety of potential IVT sites in food and agricultural sciences (FAS). From this, four subthemes were created: (1) Animal Sciences, (2) Commodities, (3) Recruitment, and (4) Other Areas of FAS.

Animal Sciences. When asked what other virtual tours they would be interested in, many participants first named sites related to animal sciences. Popular suggestions were feedlots, processing plants, and dairies. Participants said these sites could be helpful in educating those outside of the agricultural industry about where their food comes from and how it is made. Participant 10 said, “Definitely feedlots...because that’s such a big part of the ag industry, and I think a lot of people don’t get to see that, especially where I’m from... where we don’t have a lot of that kind of agriculture.”

Commodities. Many different types of commodities were also suggested as future tour sites. From growing in the field to milling, participants were interested in seeing the many processes that various crops go through. Participants even mentioned production processes of other staples such as timber, rice, fruit, almonds, and olive oil. Participant 5 said, “All grain production like sorghum, soybeans, corn, kind of the process of how all of that gets from the field to table or the field to whatever it gets turned into. I think any grain production would be good.”

Recruitment. Participants also identified using IVTs as a recruitment tool. They suggested this technology could be used to provide further insight into different facilities as well as various majors and learning opportunities at the university.

Other Areas of FAS. Outside of the aforementioned areas, participants identified several other sites for future tours. The sites mentioned pertained to a variety of the scientific processes that are seen within the agriculture industry such as genetic engineering, greenhouses, and pesticide and herbicide production.

Improving Clarity

Overall, participants provided helpful critiques for improving the development of future IVTs. Four subthemes emerged, which concerned improving the clarity of IVTs: (1) More Structure, (2) Identification Tags, (3) Provide a Beginning and an End, and (4) Additional Content Areas.

More Structure. Participants suggested adding structure to the IVT to make it seem closer to a real tour. In order to do this, it was proposed to add more directional pieces to the tour such as arrows and explainer “stops.” The current tour has four directional stops. Participant 19 said: “I think a little more structure to the tour itself. When you’re taking an in-person tour, you have a guide that’s showing you everything and so typically they’ll show you like the exact process and take you that way.”

Identification Tags. Participants suggested changing the identification tags to make them more descriptive or numbering the stops instead. The identification tags for each stop were categorized by content. For example, stops relating to machinery have a wrench icon and stops relating to crops have an ear of corn icon.

Provide a Beginning and an End. Participants commented on the chronological organization of content and suggested that in the future, creators should include a brief background piece to provide viewers with more context. Participant 32 said:

To kind of help people that don’t fully understand what it is, I think having the farming part at the beginning would add a lot of context to it. Because when it was at the end, I was like, “Oh, there it is. There’s the first step.”

Additional Content Areas. Participants made note of a few different important content pieces, as well as identified areas for additional content in future tours, or in the revision of the cotton gin IVT. Most participants emphasized the importance of having a brief overview video at the beginning of the tour to provide needed context for viewers who may not be familiar with the site. Additionally, participants said they wished there was more of a human-interest aspect to the tour. Participant 18 said: “I wouldn’t mind, like an interview. This is just me, knowing that people connect with people.”

Conclusions & Implications

The purpose of this study was to explore the perceptions students hold regarding using IVTs in an agricultural education setting. Virtual tours have been used in the classroom as an alternative to traditional on-site field trips and to facilitate experiential learning opportunities for students (Çalışkan, 2011; Cliffe, 2017; Petersen et. al, 2020; Spicer & Stratford, 2001). Virtual tours of food and agricultural science facilities do exist and have been implemented in classrooms (Herritsch et al., 2013; Karcher & Reid, 2018); however, there is limited literature on student perceptions of using virtual tours as a learning tool. This study utilized the Technology Acceptance Model as a theoretical guide to understanding students’ perceptions of virtual tours. Utilizing a convergent parallel mixed methods approach, the research team collected and analyzed quantitative and qualitative data separately then brought them together for comparison, discussion, and interpretation. Each of the quantitative TAM constructs were connected to a qualitative topic for comparison and discussion as described below. The findings provide insights about the use of food and agricultural science IVTs in agricultural education.

Perceived Usefulness and Educational Merit

The perceived usefulness scale had a high grand mean of 4.57 (the upper limit is 5.00), indicating students had positive perceptions of the usefulness of the IVT. This supports the qualitative findings related to perceived educational merit. Participants deemed IVTs as an effective learning tool. While they found the IVT to be beneficial, participants reiterated that an IVT was not a substitute for an actual field trip to the site. Previous literature evaluating student responses to the use of virtual tours in an educational setting agrees with this sentiment (Cassady et al., 2008; Herritsch et al., 2013; Spicer & Stratford, 2001). These findings indicate that IVTs are valuable educational tools. As the TAM posits, perceived usefulness is related to how technology can help one achieve a goal or complete a task (Davis, 1989). Participants recognized that the IVT was a useful way to learn more about the agricultural site and this would help them achieve classroom-related goals such as learning more about the topic. The comparison of perceived usefulness and perceived educational merit allows educators and creators of tours more insight into how participants view virtual tours, allowing them to create virtual tours that are nearly as stimulating as an actual field trip.

Perceived Enjoyment and Content

Within TAM, perceived enjoyment is “the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated” (Davis et al., 1992, p. 1113). Quantitatively, perceived enjoyment was measured through three scale items and had a grand mean of 4.26, suggesting that participants enjoyed the virtual tour experience. This finding supports the qualitative data as participants made comments such as “I was interested the whole time because I could either read it, or I could hear what they were saying in the videos.” Previous studies have found enjoyment is an important factor when predicting users’ intentions to adopt technology in virtual settings (El-Said & Aziz, 2021; Guo & Barnes, 2011; Kim & Hall, 2019; Vishwakarma et al., 2020). Perhaps the most notable finding was how much participants enjoyed the video content. A vast majority of the participants commented that they liked the videos because they were short (ranging from 30 to 50 seconds) and straight to the point. Participants even said they wished there were more videos. This is consistent with previous literature. El-Said and Aziz (2021) had a similar finding regarding the use of

virtual tours during COVID-19. One of their participants commented that “virtual tours may be combined with an introductory video giving background and describing what these sites include. It is very important to add sound (audio) explanation to the virtual tours as it is more convenient than reading” (El-Said & Aziz, 2021, p. 539). Tailoring content types to participant preferences will help ensure they stay engaged throughout the entirety of the IVT, similar to how they would likely stay engaged in an actual tour.

Perceived Ease of Use and Navigation

Perceived ease of use had a grand mean of 4.40, demonstrating participants found the tour relatively easy to use. TAM literature emphasizes the importance of perceived ease of use (Davis, 1985; Davis et al., 1992), which is influenced by design features that make the technology easier or more difficult for users to learn and implement. Participants appreciated that they could navigate the tour at their own pace, and most described the tour as easy to navigate. However, some did say they first had to orient themselves and “get the hang” of the tour before it was easy. While there are multiple ways to navigate the tour, notably, most students said they preferred using the arrows to click through the tour so they could ensure they were seeing all the content. This finding is consistent with that of Mead et al. (2019) who evaluated the ability of IVTs to promote science learning in a high school AP biology class and undergraduate biology course in the United States. While some participants in the current study did admit that it took a minute to get their bearings and become accustomed to using the technology, they said it became easier to navigate as they continued to explore the tour. Based on these findings, it can be concluded the virtual tour experience was easy to navigate and use for most participants. Even those who had difficulties initially said that as time went on, they became more comfortable using the virtual tour technology. Understanding how participants perceived the ease of navigation of the tour is vital to improving users’ overall experiences and impressions of the IVT, which can impact their intention to adopt future virtual tours.

Intention to Adopt and Future Development

The final TAM construct and qualitative question pertained to students’ intention to adopt future IVTs, future FAS sites and facilities they would like to see, and any suggestions they have for future IVTs. The intention to adopt scale had a grand mean of 4.00, which suggests most participants would use an IVT to vicariously visit an FAS site again. Students had many suggestions for IVT improvement, all of which included clarifying current “stops,” including more context about the facility at the beginning and end of the tour and overall adding more structure to the tour so it more closely simulated an actual tour. They noted IVTs could be used to showcase “any process within agriculture,” but the first suggestion was often an animal science facility. Outside of animal science facilities, participants mentioned a variety of crop-related sites, ranging from a farmer’s field to laboratories where scientists work with genetic modification technologies. Participants often referenced the ability of an IVT to enable them to visit a site they normally would not have access to. By ensuring IVTs are clear and structured, and implementing IVTs of facilities that interest specific target audiences, tour creators and educators can ensure the tours that are employed are a beneficial learning experience for their participants.

Recommendations

The current study adds to the limited prior literature regarding student perceptions of using virtual tours in an agricultural education context. As virtual tour technology becomes more available and integrated in educational settings, additional research is needed. A limitation of the current study is the low reliability of one of the TAM constructs. Future studies should continue to test and revise the scales used in this study to improve reliability, specifically the perceived usefulness scale. The Cronbach’s alpha for the perceived usefulness index was $\alpha = .67$. The lowest corrected item-total correlation was .27. Removing the second scale item, “In my opinion, virtual tours are a useful way of experiencing cotton gins,” could have improved the overall alpha coefficient to .84; however, Peterson (1994) recommended having at least three scale items, so the alpha reliability coefficient is more accurate. While previous literature deems an alpha reliability coefficient of .60 to .80 as acceptable, efforts should be made to improve all overall alpha

coefficients to above .70 (Hair et al., 2019; Hajjar, 2018; Saeed & Kassim, 2017). Revising the scale items related to perceived usefulness may be necessary to achieve an alpha coefficient at or above .70.

Future research should also replicate this study with a larger, more diverse student population. Due to the lack of diversity and small sample size of the current study, we cannot generalize the results to larger populations. While students of varying majors within colleges of agriculture should continue to be a target population, students outside of colleges of agriculture should be considered. Adult, or informal, learners could also be a population of interest. Additionally, other IVT sites should also be researched to gather insights into students' perceptions of each specific tour. As more IVTs are evaluated, researchers can also compare results between them to identify commonalities and areas of distinction. It is also recommended to collect feedback from the instructors who implement IVTs in their classroom. By receiving feedback from the instructors who are implementing them in their courses, we can learn more about how to improve the content inside of the tour for teaching purposes and identify valuable supplemental and curriculum materials. In that same vein, the students of these instructors should also be evaluated, as they have a more natural, candid view of using IVTs as learning tools, and can provide insight into what the practical application of IVTs. Finally, a general guide for creating IVTs and other virtual tours should be developed that is informed by previous studies. While some literature and research pertaining to the use of virtual tours in a classroom do address a few best practices in their discussion and conclusions, there has yet to be a comprehensive list, review, or analysis created for best practices. If such research was conducted, it could improve the content and overall effectiveness of virtual tours for educational purposes.

The findings of this research indicated students perceive IVTs as a valuable learning tool that can be used in a variety of contexts. This research provides insight into how future virtual tours can be developed to be as effective as possible. The findings of this research led to several recommendations for practice. The first recommendation is for future IVT creators to utilize videos throughout their IVTs. Almost all students stated that they enjoyed the video content best, as it simplified the information and presented it effectively. Based on this, it is a strong recommendation that creators use videos that are less than 90 seconds as the main source of information dissemination. Then, photos and descriptions can be used as complementary content pieces to the videos. Additionally, it is recommended that there be "start of tour" and "end of tour" videos to provide necessary context, as well as a more structured IVT experience, similar to a traditional tour. Creators should consider integrating a human-interest aspect into these videos, as well as other videos throughout the tour, if possible. Students noted that "people connect with people" and that they wished to know more of the personal history behind the gin. Adding these aspects to future IVTs will ensure a well-rounded and complete experience for students.

Future tour creators and researchers should also consider investigating the additional sites participants recommended in this study. Based on their responses, it is apparent students are interested in seeing sites of various animal science facilities, as well as different crop and other commodity processes. Colleges of agriculture and other agricultural facilities (e.g., a vet school) should also consider creating IVTs to highlight some of their more notable and most used facilities, which will contribute to recruitment efforts. Further analysis of perceived learning should be another area of interest for future researchers. The current study did not attempt to measure learning but simply asked students to recall some facts or information they remembered and why they were able to remember that piece of information. Prior research has studied what students learn through IVT. Herritsch et al. (2013) compared the test results of two groups: students who received the unit material through an IVT, and students who received the material in a document. Students who received the IVT performed better on the test and spent less time studying the material. It is recommended that a similar study be conducted in an agricultural context so researchers can attempt to determine the educational impacts IVTs can have in comparison to traditional teaching methods regarding this content.

Finally, it is recommended that educators begin to utilize IVTs more regularly in their classrooms as a learning tool. Participants mentioned they enjoyed the tour experience and thought it was a nice change of pace from a typical lecture. They also mentioned the tour could be useful in sparking discussion among the class and could be the topic for a variety of assignment types. IVTs can provide educators with an alternative to traditional field trips, which may not be feasible for everyone. The IVTs eliminate some of the barriers of a traditional field trip and may enable students to visit sites that are not common in their local area or would have restrictions on in-person tours. Moreover, IVTs can be used as a complement to traditional field trips. Instructors can disseminate the IVT to their students prior to the actual tour as a preparation tool, or the IVT can be used post-tour to review the material covered in the actual tour and to learn more about the facility.

References

- Alcântara, L., R. (2016). Using English to learn while learning to use English: International field trips as a way to learn (through) language. *International Journal on Language, Literature and Culture in Education*, 3(2), 141–149. <https://doi.org/10.1515/llce-2016-0015>
- Arcodia, C., Abreu Novais, M., Cavlek, N., & Humpe, A. (2021). Educational tourism and experiential learning: students' perceptions of field trips. *Tourism Review (Association Internationale D'experts Scientifiques Du Tourisme)*, 76(1), 241–254. <https://doi.org/10.1108/TR-05-2019-0155>
- Association for Experiential Education. (2023) What is experiential education? <https://www.aee.org/what-is-experiential-education>
- Behrendt, M., & Franklin, T. (2014). A review of research on school field trips and their value in education. *International Journal of Environmental and Science Education*, 9(3), 235–245. <http://files.eric.ed.gov/fulltext/EJ1031445.pdf>
- Çaliskan, O. (2011). Virtual field trips in education of earth and environmental sciences. *Procedia - Social and Behavioral Sciences*, 15, 3239–3243. <https://doi.org/10.1016/j.sbspro.2011.04.278>
- Cliffe, A. D. (2017). A review of the benefits and drawbacks to virtual field guides in today's geoscience higher education environment. *International Journal of Educational Technology in Higher Education*, 14(28). <https://doi.org/10.1186/s41239-017-0066-x>
- Cassady, J. C., Kozlowski, A., & Kornmann, M. (2008). Electronic field trips as interactive learning events: Promoting student learning at a distance. *The Journal of Interactive Learning Research*, 19(3), 439–454. https://www.learntechlib.org/p/24187/article_24187.pdf
- Connelly, L. (2016). Trustworthiness in qualitative research. *Medsurg Nursing*, 25(6), 435-436
- Creswell, J. W., & Miller, D. (2000). Determining validity in qualitative research. *Theory into Practice*, 39(3), 124–130.
- Creswell, J. W., & Plano Clark, V. L. (2011). Choosing a mixed methods design. In *Designing and conducting mixed methods research* (pp. 53–106). essay, SAGE.
- Davis, F. (1985). A technology acceptance model for empirically testing new end-user information systems: theory and results. *Ph. D. Dissertation, Massachusetts Institute Of Technology*. <http://ci.nii.ac.jp/naid/20001062454>

- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319. <https://doi.org/10.2307/249008>
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*, 22(14), 1111–1132. <https://doi.org/10.1111/j.1559-1816.1992.tb00945.x>
- El-Said, O., & Aziz, H. (2021). Virtual tours a means to an end: an analysis of virtual tours' role in tourism recovery post COVID-19. *Journal of Travel Research*, 61(3), 528–548. <https://doi.org/10.1177/0047287521997567>
- Field, A. (2024). *Discovering statistics using IBM SPSS statistics* (6th ed.). SAGE Publications Ltd.
- Guest, G., Namey, E., & McKenna, K. (2017). How Many focus groups are enough? Building an evidence base for nonprobability sample sizes. *Field Methods*, 29(1), 3–22. <https://doi.org/10.1177/1525822X16639015>
- Guo, Y., & Barnes, S. (2011). Purchase behavior in virtual worlds: An empirical investigation in Second Life. *Information & Management*, 48(7), 303–312. <https://doi.org/10.1016/j.im.2011.07.004>
- Hair, J. F., LDS Gabriel, M., Silva, D. D., & Braga, S. (2019). Development and validation of attitudes measurement scales: fundamental and practical aspects. *RAUSP Management Journal*, 54(4), 490–507.
- Hajjar, S. T. (2018). Statistical analysis: internal-consistency reliability and construct validity. *International Journal of Quantitative and Qualitative Research Methods*, 6(1), 27–38.
- Han, I. (2020). Immersive virtual field trips and elementary students' perceptions. *British Journal of Educational Technology*, 52(1), 179–195. <https://doi.org/10.1111/bjet.12946>
- Hennink, M. M, Kaiser, B. N., Weber, M. B. (2019). What influences saturation? Estimating sample sizes in focus group research. *Qualitative Health Research*. 1483–1496. [doi:10.1177/1049732318821692](https://doi.org/10.1177/1049732318821692)
- Herritsch, A., Rahim, E., Fee, C. J., Morison, K. R., & Gostomski, P. A. (2013). An interactive virtual tour of a milk powder plant. *Chemical Engineering Education*, 47(2), 107–114.
- Hosticka, A., Schriver, M., Bedell, J. & Clark, K. (2002). Computer based virtual field trips. *Proceedings of ED-MEDIA 2002--World Conference on Educational Multimedia, Hypermedia & Telecommunications* (pp. 312–316). Association for the Advancement of Computing in Education (AACE). <https://www.learntechlib.org/primary/p/9289/>.
- Karcher, E. L., & Reid, P. (2018). The use of virtual farm tours in a dairy cattle management course. *NACTA Journal*, 62(4), 371–375.
- Kim, M., & Hall, C. (2019). A hedonic motivation model in virtual reality tourism: Comparing visitors and non-visitors. *International Journal of Information Management*, 46, 236–249. <https://doi.org/10.1016/j.ijinfomgt.2018.11.016>

- Knapp, D. (2000). Memorable experiences of a science field trip. *School Science and Mathematics, 100*(2), 65–72. <https://doi.org/10.1111/j.1949-8594.2000.tb17238.x>
- Krueger, R. A. & Casey, M. A. (2014). *Focus groups: A practical guide for applied research*. California: SAGE Publications.
- Lei, S., A. (2010). Field trips in college biology and ecology courses: Revisiting benefits and drawbacks. *Journal of Instructional Psychology, 37*(1), 42.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: SAGE Publications.
- Marangunić, N., & Granić, A. (2014). Technology acceptance model: a literature review from 1986 to 2013. *Universal Access in the Information Society, 14*(1), 81–95. <https://doi.org/10.1007/s10209-014-0348-1>
- Mead, C., Buxner, S., Bruce, G., Taylor, W., Semken, S., & Anbar, A. D. (2019). Immersive, interactive virtual field trips promote science learning. *Journal of Geoscience Education, 67*(2), 131–142. <https://doi.org/10.1080/10899995.2019.1565285>
- Partyka, R., Riggs, A., Cartmell, D., & Cota, L. (2019). Students' perceptions of an agricultural communications field trip 1. *NACTA Journal, 63*(1), 65–71.
- Petersen, G. B., Klingenberg, S., Mayer, R. E., & Makransky, G. (2020) The virtual field trip: Investigating how to optimize immersive virtual learning in climate change education. *British Journal of Educational Technology, 51*(6), 2099–2115. <https://doi.org/10.1111/bjet.12991>
- Peterson, R. A. (1994). A meta-analysis of Cronbach's coefficient alpha. *Journal of Consumer Research, 21*(2), 381–391. Retrieved 2023, from <https://www.jstor.org/stable/2489828>.
- Rugaiyah, R. (2022). Experiential learning through field trips: An overview. *Al-Ishlah: Jurnal Pendidikan, 14*(4), 6255–6266. <https://doi.org/10.35445/alishlah.v14i4.1972>
- Saeed, F. T. A., & Kassim, R. N. M. (2017). Validation measurement model of media staffs' satisfaction, leadership, pay, working environment, rewards and performance. *World Journal of Research and Review, 5*(3), 84–88
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63–75. <https://doi.org/10.3233/efi-2004-22201>
- Spicer, J., & Stratford, J. (2001). Student perceptions of a virtual field trip to replace a real field trip. *Journal of Computer Assisted Learning, 17*(4), 345–354. <https://doi.org/10.1046/j.0266-4909.2001.00191>
- Thomas, E., & Magilvy, J. K. (2011). Qualitative rigor or research validity in qualitative research. *Journal for Specialists in Pediatric Nursing, 16*(2), 151–155. <https://doi.org/10.1111/j.1744-6155.2011.00283.x>
- Vishwakarma, P., Mukherjee, S., & Datta, B. (2020). Travelers' intention to adopt virtual reality: A consumer value perspective. *Journal of Destination Marketing and Management, 17*, 100456. <https://doi.org/10.1016/j.jdmm.2020.100456>

- Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, 15(1), 45–72. <https://www.proquest.com/scholarly-journals/art-coding-thematic-exploration-qualitative/docview/2210886420/se-2>
- Wright, M., C. (2000). Getting more out of less: The benefits of short-term experiential learning in undergraduate sociology courses. *Teaching Sociology*, 28(2), 116–126. <https://doi.org/10.2307/1319259>