



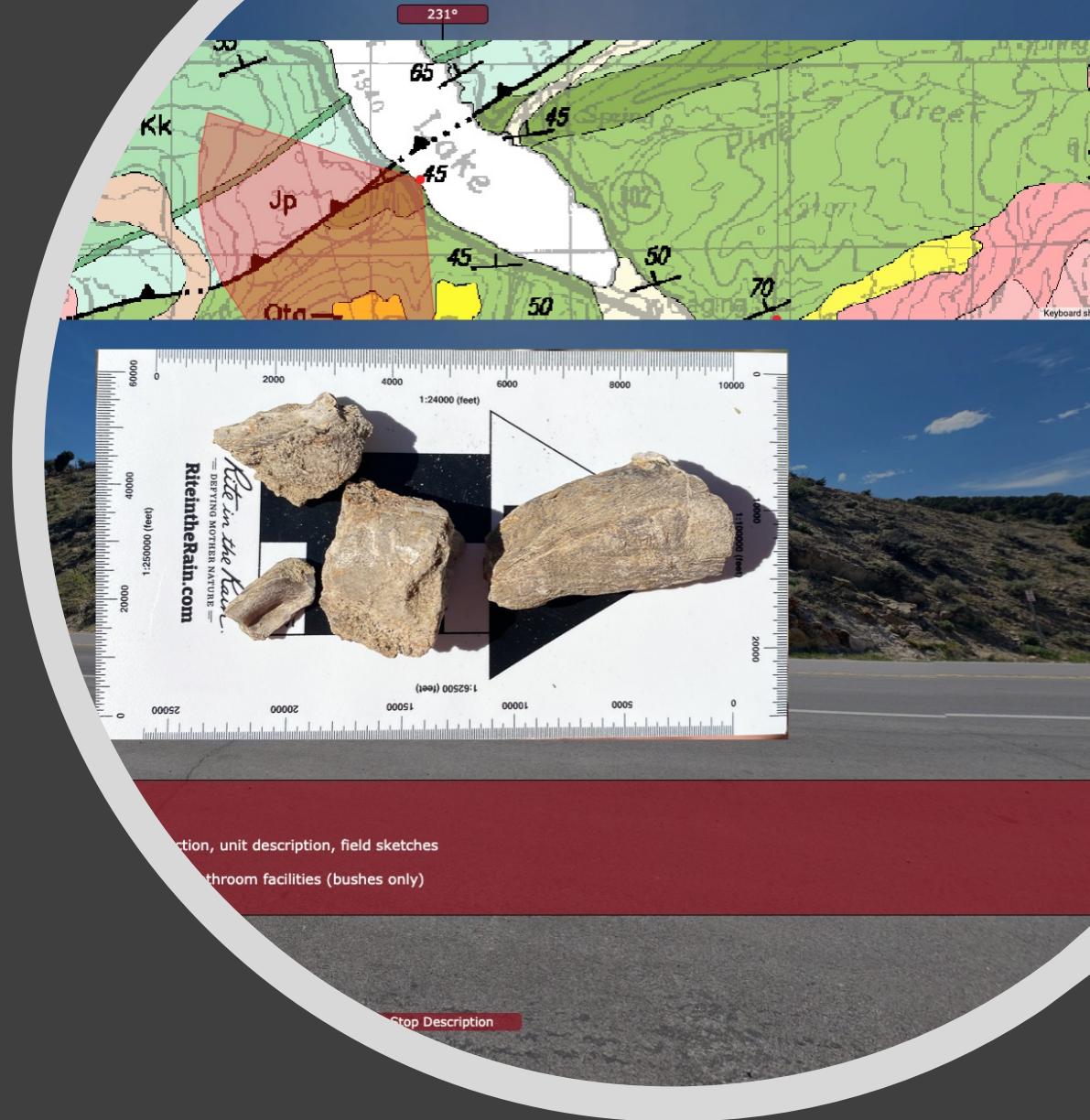
Virtual field tools to establish expectations and reduce anxiety

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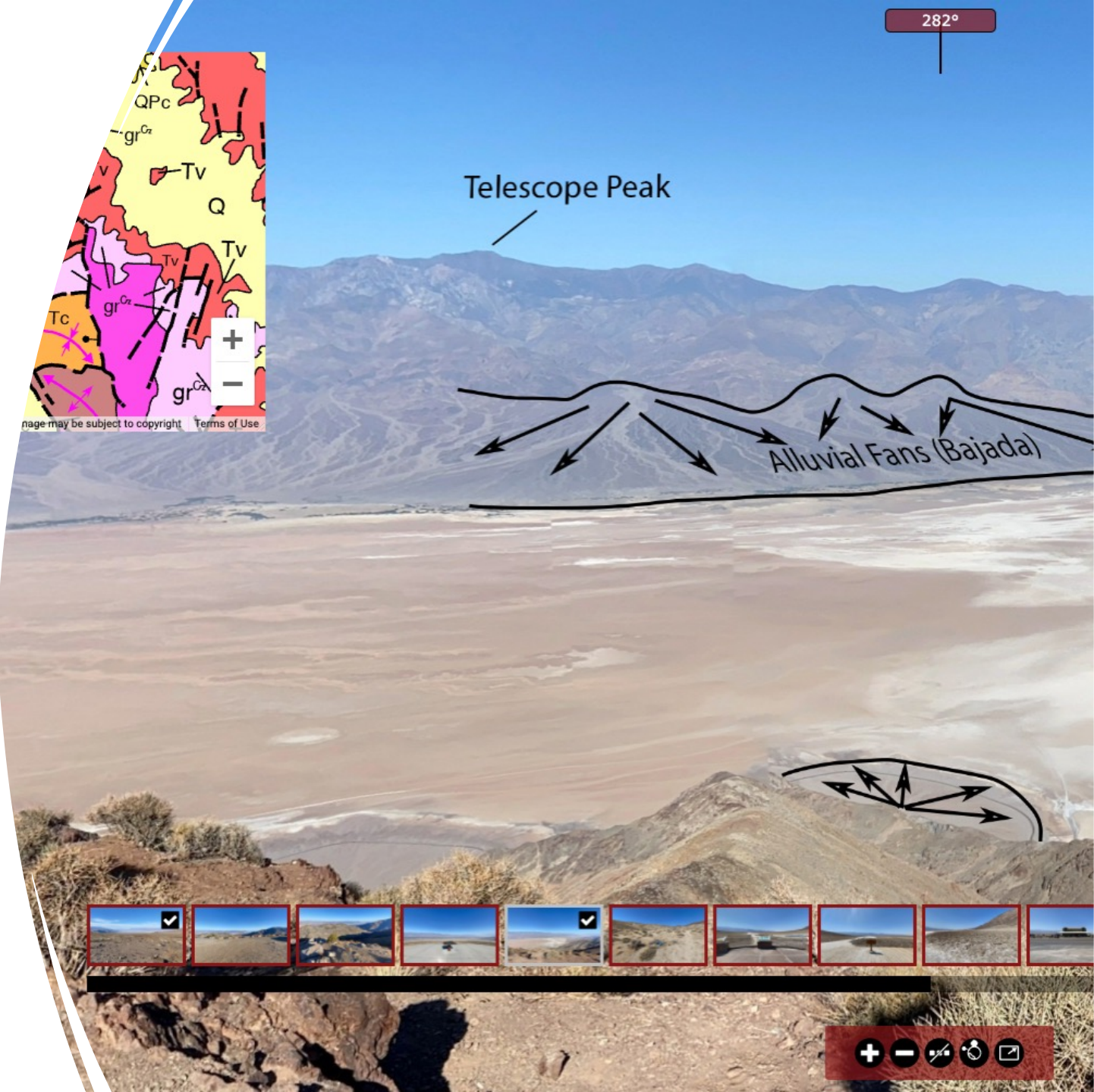
Acknowledgements

- Stanford Transforming Learning Accelerator
- Stanford School of Earth, Energy, and Environmental Sciences
- Gordon and Betty Moore Foundation
- Links and References can be found here:



Outline

- What is a virtual field tools?
- What can we do with virtual field tools?
- Novelty space, cognitive load, and anxiety
- Study setting
- VFT Walkthrough
- How does one make a virtual field trip?
- Study method
- Data!
- Final thoughts and Work group goals





What are virtual field tools and virtual field trips (VFTs)?

- **Bringing the field to the learner**
- Many ways to do that...
 - Platforms - online, desktop, etc
 - Deployment methods - self-guided, instructor-led, group zoom
 - Activities – Field guide, location yourself, observations, collect data, sketch, etc

What can we do with Virtual Field Trips (VFTs)?

- A way to provide online or classroom activities that recreate the **outcomes** of in-person field trips.
- To provide participants (and potential participants) with better information prior to an experience so that they are better prepared to learn.



Novelty Space, Cognitive Load, and Anxiety

- Novelty Space (Orion and Hofstein, 1994)
- Cognitive Load (Sweller et al 1998, Sweller 2019) and it's application to field education and safety (Burmeister et al *in prep*)
- Anxiety and working memory (Moran 2016)
- Part of a much larger movement in earth sciences to provide more accessible and inclusive field experiences (summarized by Chiarella and Vurro, 2020)

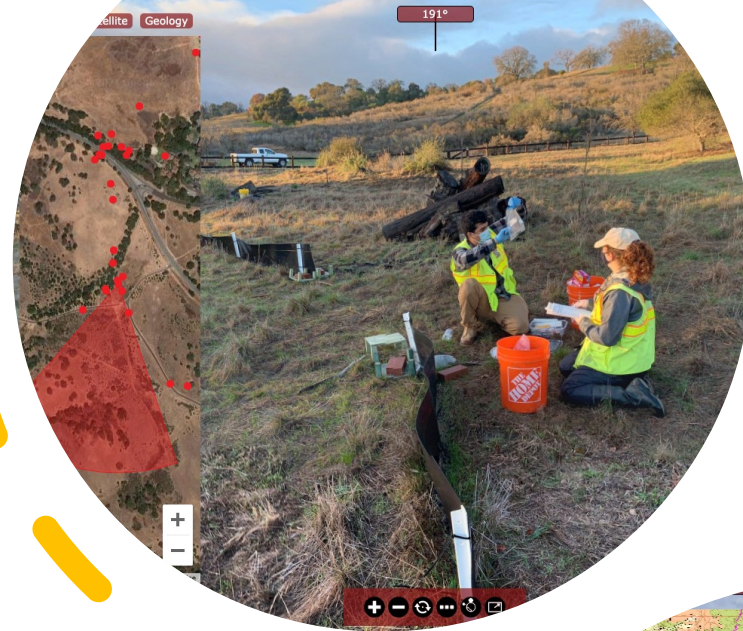


For complete references



Novelty Space, Cognitive Load, and Anxiety

- Stress and anxiety associated with unfamiliar environments and practices may disproportionately affect students without prior access to outdoor activities.
- Our goal for this project was to reduce (or equalize) the pre-trip anxiety for participants by allowing them to peruse the locations virtually before going into the field (theoretically producing improved learning outcomes, but that's a next step to test)



Example #1: Wasatch-Uinta Field Camp

- Summer field camp set in and around the Wasatch and Uinta Mountains, Utah
- ~60 Students from multiple universities, with variable backgrounds and experience levels (56 participated in the study)
- First day of field camp is a regional overview trip that shows students the locations and environments they will be working in over the next few weeks.
- We created a virtual version of this regional overview, showing locations, scheduling information, bathroom availability, and basic topic information.





Tour of tour

How does one make a virtual field trip?

- Photography

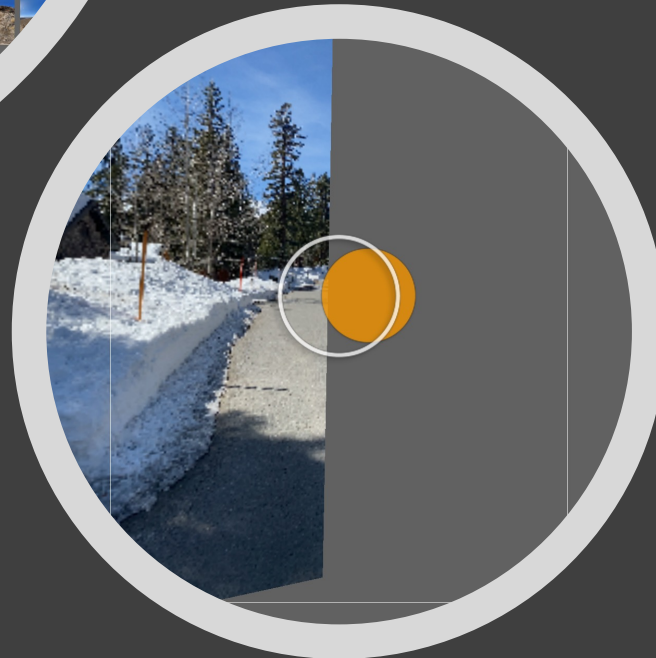
- 360 Cameras (GoPro, Insta360, Ricoh Theta)
- 3D model capture (Matterport)
- DSLRs and stitching
- Drones
- Google Street View App

- Construct the tours

- Online software (Panoskin, Gothru Moderator, ThingLink)
- Desktop Software (Panotour Pro, Pano2VR)

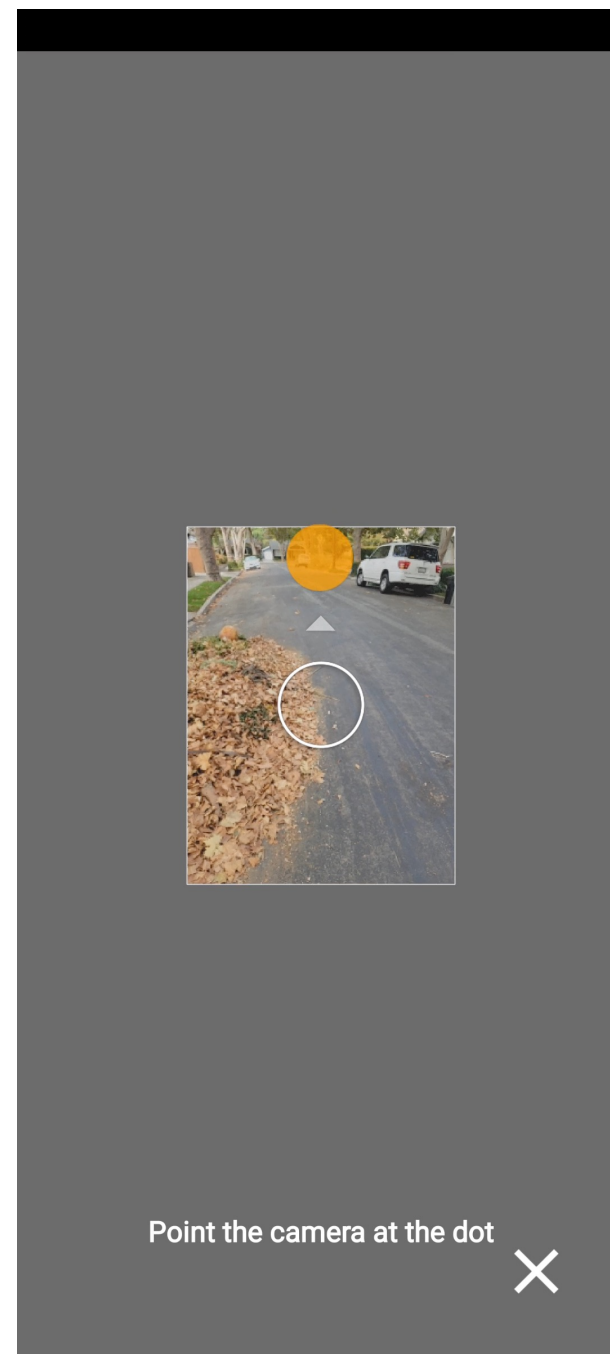
- Distribute Tours

- Integrated with online tour software
- Requiring web hosting site



Step 1: Photography – Google Street View App

- Google Street View App is free to use (iPhone/Android)
- App collects multiple photos and stitches a single 360 photo (a 'photosphere')
- All stitching is done in-app, requiring no other software
- The output is a simple JPG file that can be warped into a 360 degree view by various programs.
- Only relies on technology that most people have access to already



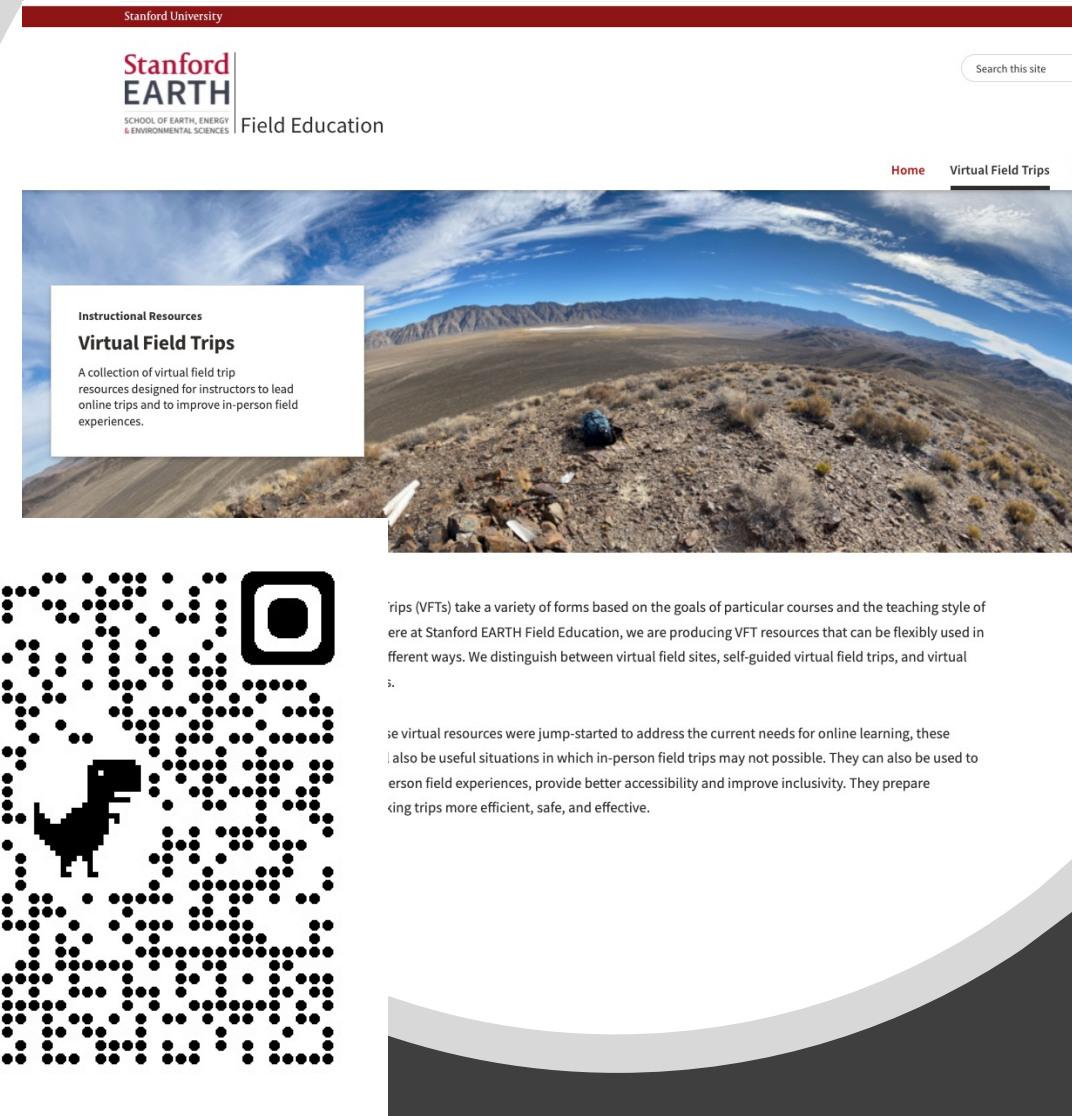
Step 2: Construct the tour – Pano2VR

- Single purchase desktop software (with educational discounts)
- Steeper learning curve than online options, but allows for much more customization, particularly in maps and overlays
- Allows for the creation of “skins” that provide the functionality. Which, once created, can be applied quickly to new tours.
- Annotations can be made in Photoshop (or other photo editing programs) and integrated through Pano2VR



Step 3: Posting the VFT

- Outputs from Pano2VR are HTML5 format, so can be posted to any standard web hosting service and accessed via any web browser (including mobile devices)
- Many free to use examples can be found at the Stanford EARTH Virtual Field Trips page.
- The tour links can also be sent via email, posted to canvas or blackboard, or accessed via QR-codes.



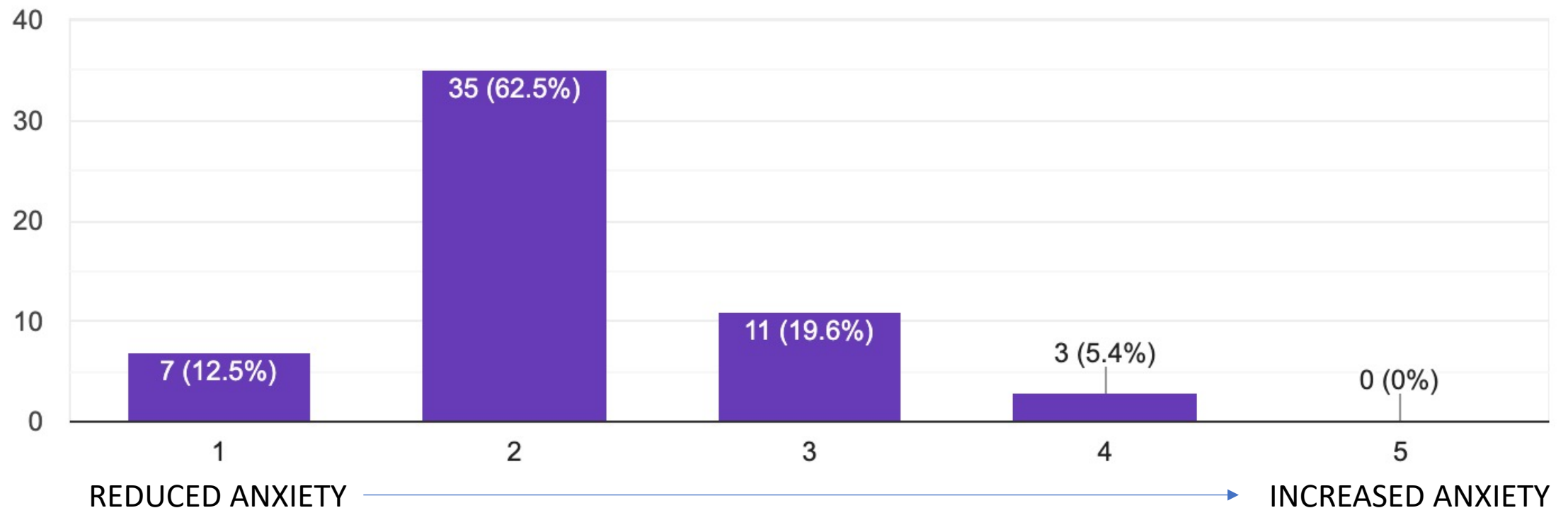
Study Method

- Students participating in the Wasatch-Uinta Field Camp were first provided with the “standard” orientation program on the first night.
- They were then provided with a virtual version of the first day of field camp (6/13/2021).
- 3 weeks later they were surveyed (7/7/2021) about their attitudes and perceptions about feelings of anxiety and preparation before and after viewing the VFT.



To what degree did first virtual field trip affect your anxiety during the day one regional overview trip? (3 = Unchanged)

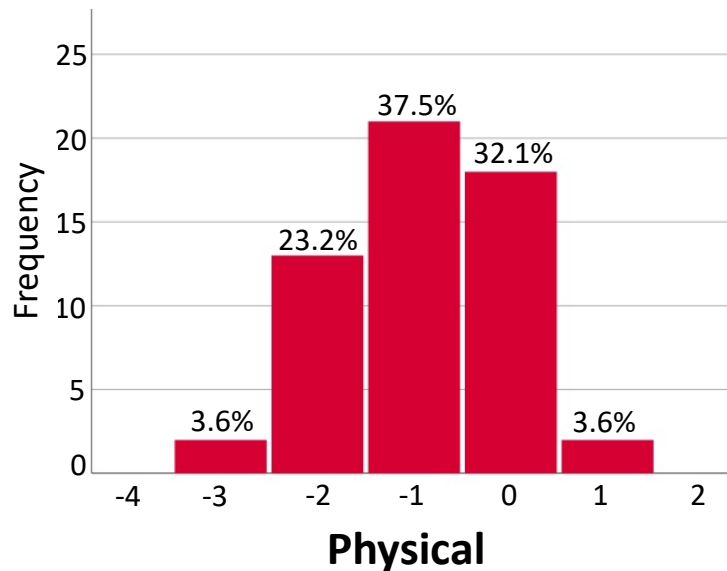
56 responses



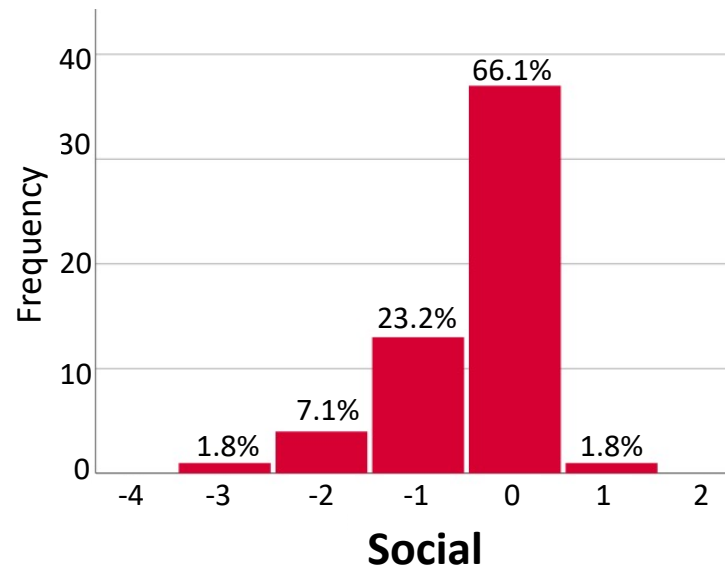
Prior to the introduction of the first Virtual Field Trip, how ANXIOUS did you feel about the first day of field camp in the following aspects (Physical/Social/Acad)? (1-5)

After perusing the first Virtual Field Trip, how ANXIOUS did you feel about the first day of field camp in the following aspects (Physical/Social/Acad)? (1-5)

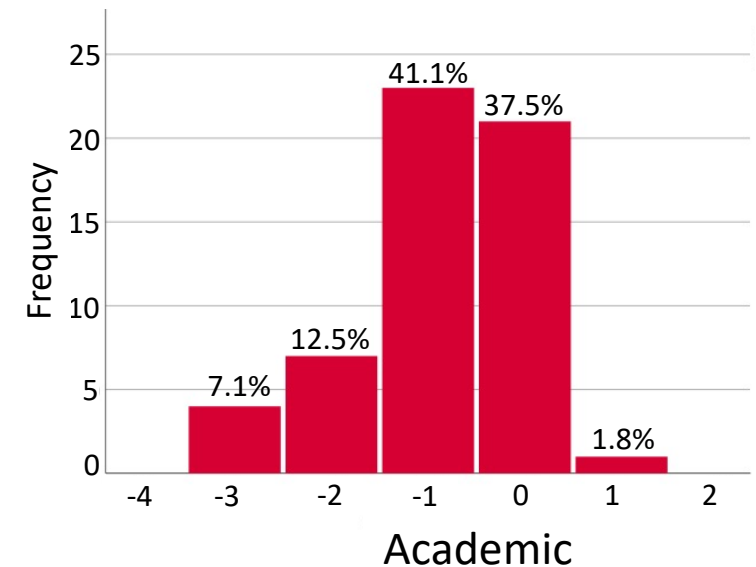
Anxiety: Post – Pre “Gain” Scores



Mean Change = $-.91$
SD = $.92$
N = 56



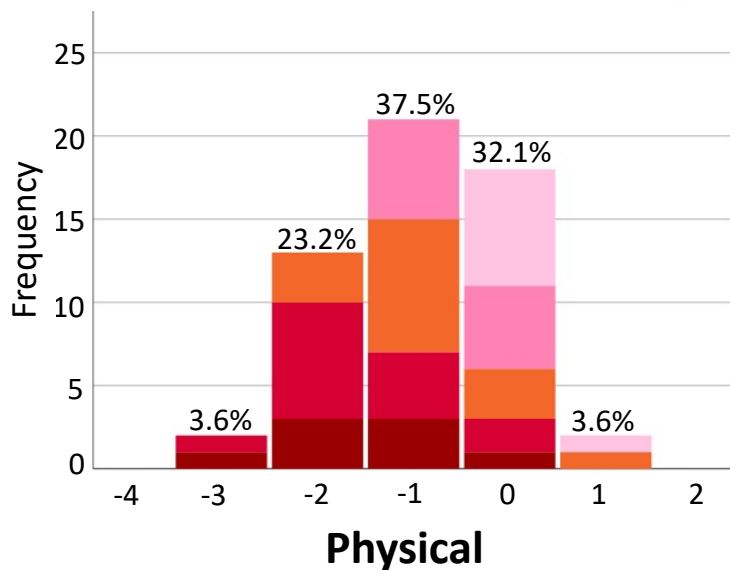
Mean Change = $-.41$
SD = $.73$
N = 56



Mean Change = $-.86$
SD = $.92$
N = 56

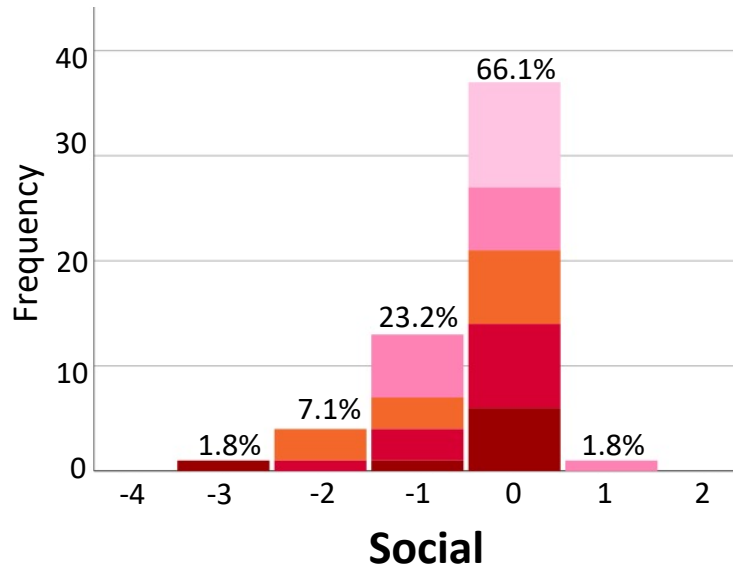
Anxiety: Gain Scores split out by Pre-Score

Pre-Anxiety
Physical



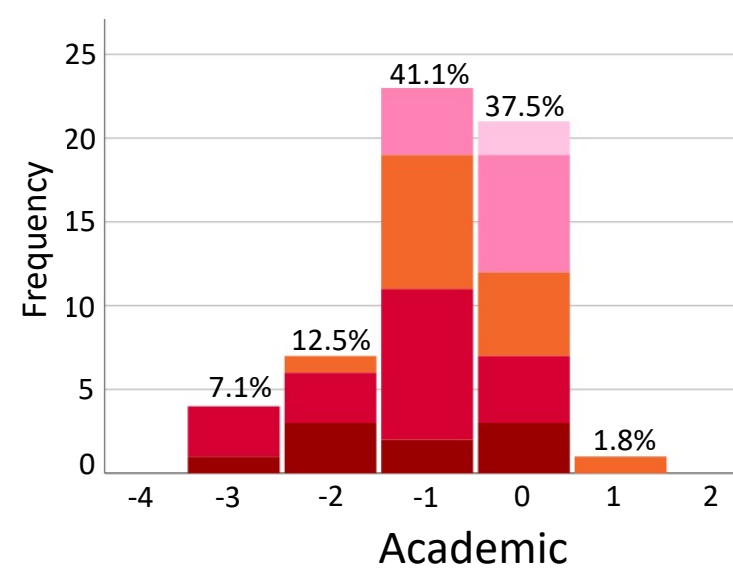
Mean Change = $-.91$
SD = $.92$
N = 56

Pre-Anxiety
Social



Mean Change = $-.41$
SD = $.73$
N = 56

Pre-Anxiety
Academic



Mean Change = $-.86$
SD = $.92$
N = 56

Student Quotes

(Bold added for clarity)

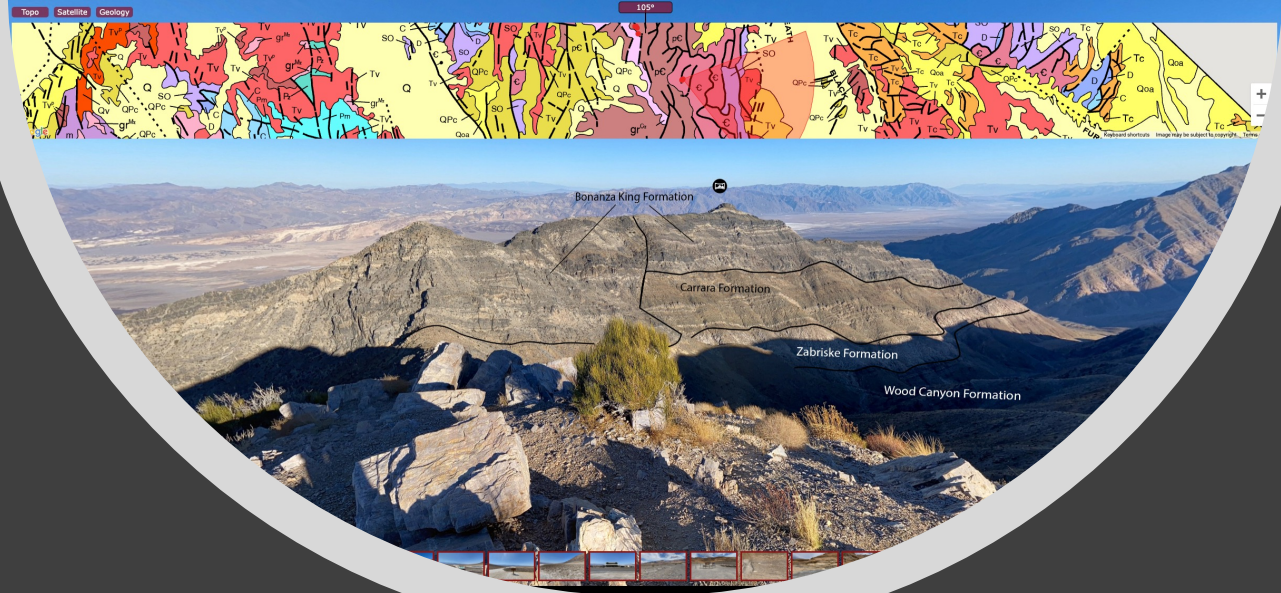
- Knowing the specifics of the day decreased my anxiety and **allowed me to focus on the teachings** more intently
- The virtual field trips helped me ease anxiety related to scheduling, such as feeling better about **knowing when I can use the bathroom** or how many stops there are.
- I think the virtual field trips help tremendously with my anxiety level. I am able to click through all the formations, see them, read about them before even going into the field. This is an incredibly helpful program that **helps me feel so much more prepared in the field.**
- **Knowing what stops had what facilities** and when/where to expect lunches, breaks, etc was helpful in planning for the days and **managing anxiety** about those aspects



More examples

Final Thoughts

- The preliminary data here, combined with the ease of production, is sufficiently convincing to me to include this type of virtual field introduction to all my field trips.
- Providing better pre-trip information is just one tool for creating equitable, inclusive, and safe field experiences. There are still lots of other things that need to be done in conjunction with this.
- Broadening access and improving in-person field experiences must also be done in conjunction with re-evaluating the traditional expectations for field work.



Topo Satellite Geology 105°

Bonanza King Formation

Carrara Formation

Zabriskie Formation

Wood Canyon Formation

Cobble Conglomerate

Stop 7c: Echo Canyon - Stream channel

Geology: Echo Canyon, Evanston, Wasatch Fms., fanning angular unconformities

Activities: Introduction of Mesozoic-Cenozoic stratigraphic section

Logistics: Multiple roadside stops and short walks along canyon (1 hour total)

Health & Safety: roadside - high-visibility vests, no bathroom facilities (bushes only)

Stop Description

-
- Stop 7c: Echo Canyon - Stream channel**
- Geology:** Echo Canyon, Evanston, Wasatch Fms., fanning angular unconformities
- Activities:** Introduction of Mesozoic-Cenozoic stratigraphic section
- Logistics:** Multiple roadside stops and short walks along canyon (1 hour total)
- Health & Safety:** roadside - high-visibility vests, no bathroom facilities (bushes only)
- Below the banner, there is a row of 12 small thumbnail images showing various geological features and landscapes. The first thumbnail has a checkmark icon. Below the thumbnails is a navigation bar with a 'Stop Description' label and a series of icons for zooming and navigation.