

Learning from the patient's perspective: New worlds in Medical Illustration



Carrie Shaw, MS
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“How do you get a 24 year old medical student to understand what it is like to be someone 60 years older than themselves?”

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Carrie Shaw, CEO

MS, Biomedical Visualization
5 yrs+ public health educator



Thomas Leahy, Technology

BS, Computer Science
Human-Computer Interaction



Ryan Lebar, Creative

BFA, Film & Theater
Virtual Reality Filmmaker



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10 yrs+ education technologist

Select Scientific Advisors



Olusola Ajilore, MD, PhD



Geriatric Mental Health
& Neuroscience Expert



Neelum Aggarwal, MD



Sr. Population Health
Neurologist



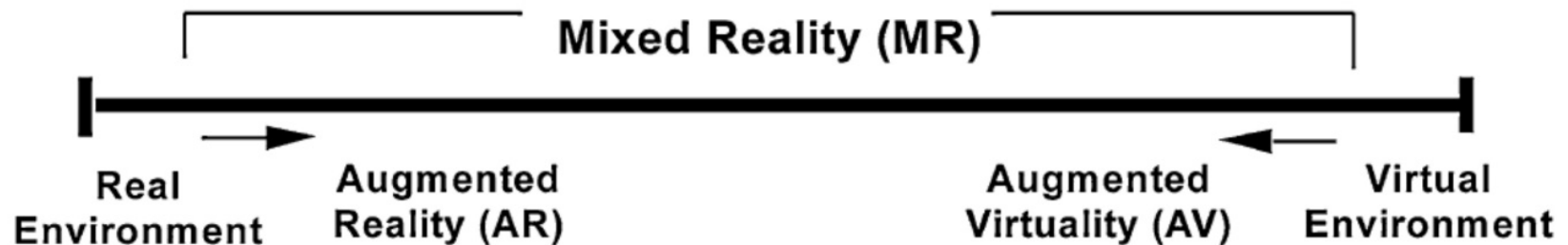
William Hazzard, MD



Founding Father of
Geriatric Medicine

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XR: Virtual, Augmented, & Mixed Reality



Paul Milgram's Reality-Virtuality continuum

Not all VR is the same: Mobile VR



Google cardboard



Samsung Gear VR



Google Daydream

Not all VR is the same: Desktop VR

1. Oculus Rift - Facebook
2. HTC Vive
3. Playstation VR
4. Windows Mixed Reality Headset - Microsoft (Coming soon)
5. Daydream 2 - HTC & Google (Coming Soon)



Strengths of VR: Active Learning



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Strengths of VR: Complex assessment

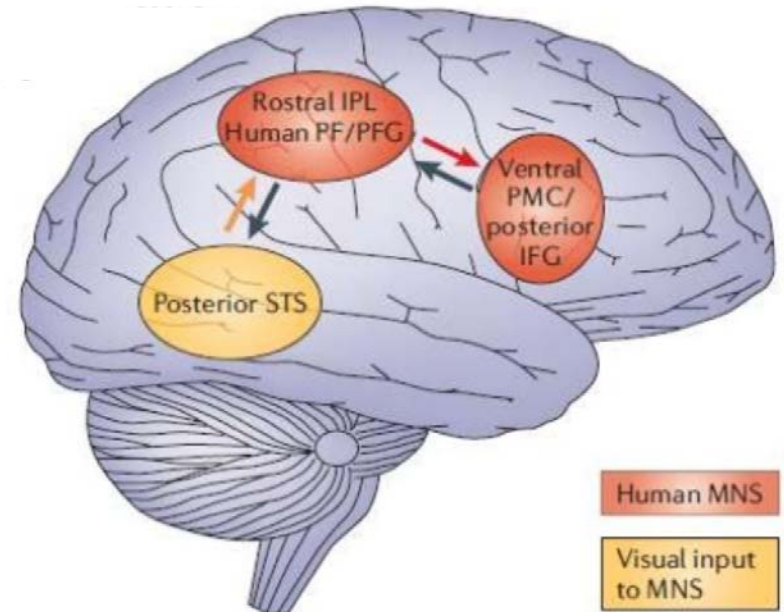


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Embodied Cognition

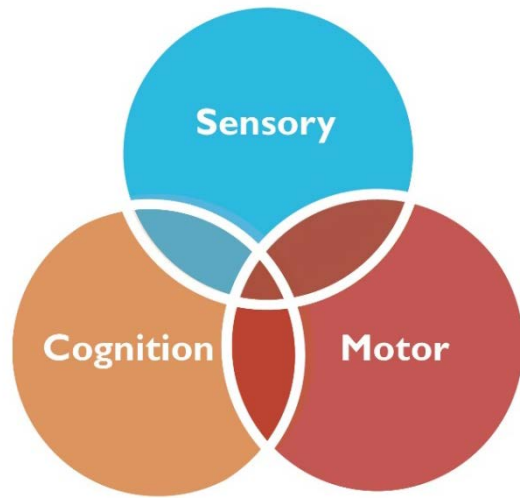
All of a person's abstract inferences are structured in an **image schema** – a correlation of an idea to a pattern of movement, orientation, or interaction of the body.

(Lakoff & Johnson 1980)



Embodied Cognition & Learning

Embodied learning marries the tacit schemas through which tasks are intuitively carried out with the analytical reasoning required to learn.



Interactions:

- Mind and body
- Thought and action
- Rational schemas and sensorimotor schemas

Embodied Learning



Impacts socioemotional learning with respect to increased...

- motivation to learn content
- understanding of concepts
- ability to self-identify with content & concepts

The 5D framework for XR design



1. **Depth:** Quality & depth of content.
2. **Sustainability:** Feasibility of the XR world to be used over time.
3. **Spread:** Ability for large numbers of people to use the XR world.
4. **Shift:** Learners begin to think of the world as their own, rather than belonging to those who designed it.
5. **Evolution:** Iteratively redesigning the world based on assessment from learners.

Sawyer 2006

FIRST EMBODIED VR EXPERIENCE



The Alfred Lab

- Live-action 7 minute 360° film
- Computer-generated interactive objects
- 3D binaural sound

Who is Alfred?

- A 74 year old African-American patient
- Advanced macular degeneration
- High frequency hearing loss

Pre-production	Production	Post-production	Deployment
<ul style="list-style-type: none"> Project ideation session Script outline Script drafts 1 & 2 Final script Location scout Casting on location 	<ul style="list-style-type: none"> 2 day 12 hour shoot 6k resolution Monoscopic video Spatial audio sound recording 5 person crew <ul style="list-style-type: none"> Director Sound mixer 2 camera technicians Producer 	<ul style="list-style-type: none"> High resolution stitching Draft 1 & 2 Color grading Spatial sound design Game engine interaction 	<ul style="list-style-type: none"> Embodied Labs application includes: <ul style="list-style-type: none"> Hardware checks Easy user onboarding guide User Metrics

Scene	Learning Goals	
Scene 1: Happy Birthday song	<ul style="list-style-type: none"> To introduce the learner to being Alfred. To expose the learner to audiovisual perceptive changes. 	
Scene 2: Day Dream	<ul style="list-style-type: none"> To understand how to use the leap motion hand controls. To contrast the audiovisual perceptive deficits present in scene 1 but absent in scene 2. 	
Scene 3: Wine spill	<ul style="list-style-type: none"> To learn about family interactions that occur outside of the clinic. 	
Scene 4: Waiting room	<ul style="list-style-type: none"> To feel what a clinic environment is like while having Alfred's audiovisual perceptive deficits. 	
Scene 5: Taking the cognitive test	<ul style="list-style-type: none"> To learn from the patient's perspective how a geriatrician introduces a cognitive test. To feel what it is like to have to compensate for a disability. 	
Scene 6: Follow up with doctor	<ul style="list-style-type: none"> To understand audiovisual perceptive changes may be misdiagnosed as cognitive impairment. To contrast hearing loss from previous scenes with normal hearing once the hearing device has been accepted by the learner. 	

Key:  Cognitive  Affective  Procedural

Principles of design & Alfred

- Scaffolded learning experience
- Learning goals increase in complexity over time
- Learning goals: cognitive, affective, and procedural

WHAT IS AN EMBODIED LAB?

An Embodied Lab has 3 stages:

1. **PREPARE** | Pre-assessment, 360° video documentaries
2. **EMBODY** | Embodied 1st person VR patient experience
3. **REFLECT** | Post-assessment, Debrief & Reflect



PRODUCT

Subscription-based software made up of a growing library of patient experience labs.



VIRTUAL REALITY

Embodied experiences
360 films



CURRICULUM

Customized Assessment
Case presentation
Facilitator guide

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LABS IN THE PIPELINE

ELDERLY

- Vision Loss | **Alfred**
- Hearing Loss | **Alfred**
- Cancer
- Alzheimer's
- Parkinson's
- End of Life Decisions

LEARNING DISABILITY

- ADD
- Dyslexia

PSYCH

- Depression
- Anxiety
- Schizophrenia
- Anorexia
- Psychosis

DEVELOPMENTAL IMPAIRMENTS

- Autism
- Down's
- Cerebral Palsy

DIVERSITY

- Literacy
- English as a 2nd Language
- Immigrant
- Trans-Health
- Obesity
- Low SES Health

DISEASES

- Cancer
- Stroke
- Multiple Sclerosis
- Diabetes II

CHILDREN

- Type I Diabetes
- Learning Disabilities

MEN/WOMEN'S HEALTH

- High Risk Pregnancy



VR EXPERIENCE



CURRICULUM

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Challenges

1. **Content is fragmented.**
2. Medical VR = many types
3. Platforms today: myriad of content, no one customer type or end user.
4. VR healthcare soft-skills training – content is minimal
5. **Content creation is expensive**
6. Meaningful content is **hard to create.**
7. Quality standards do not exist yet.
8. **Platforms for healthcare have a unique set of needs.**
9. **The hardware is changing rapidly.**

Platforms cannot succeed without a critical mass of desirable content.

Big Alfred

Alfred 1

Baby Alfred



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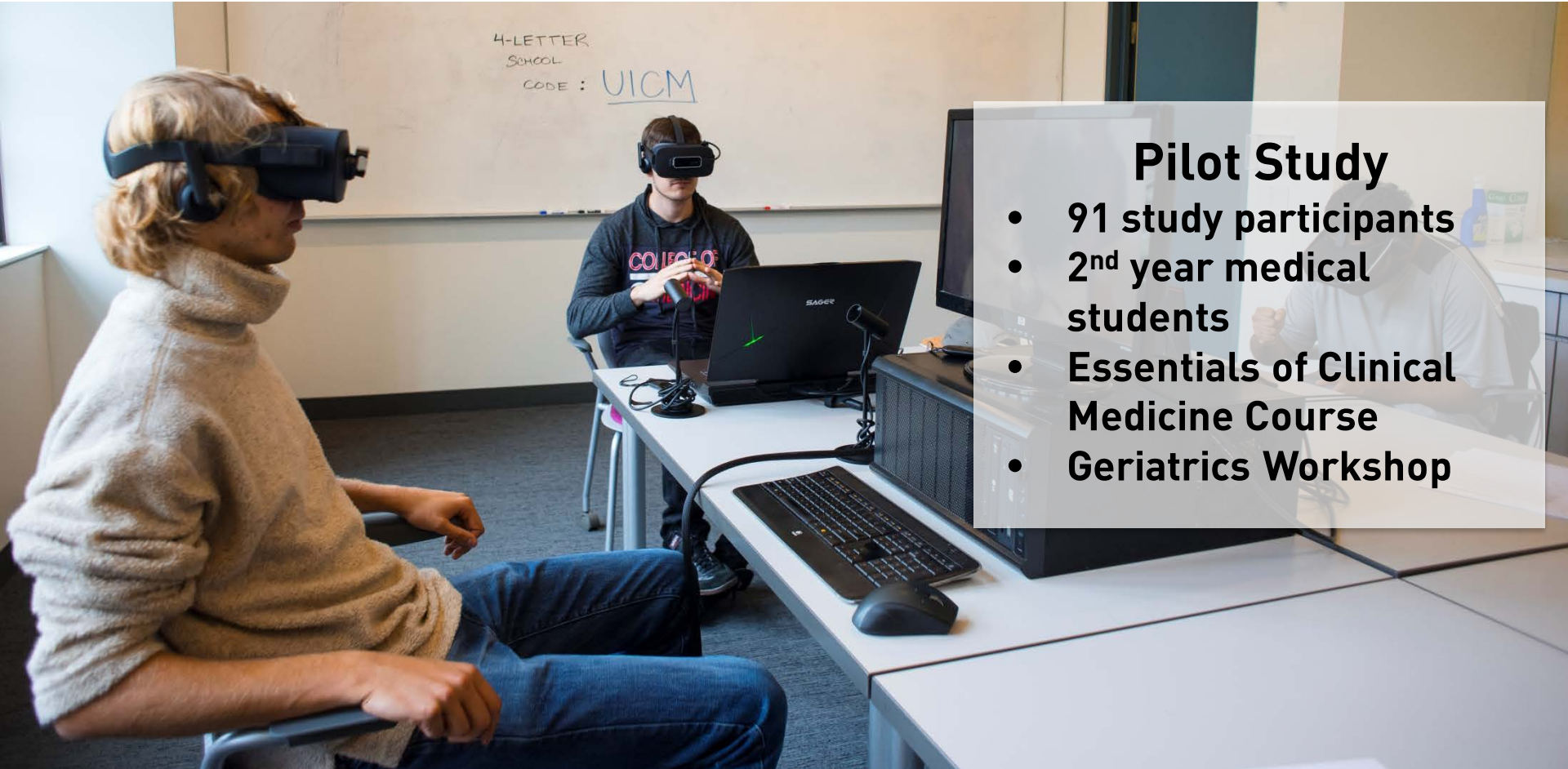
Select Customers



“This app...will change how we treat patients by providing an immersive experience that creates emotional intelligence and ultimately more compassionate care.” [Forbes]

-Dr. Leslie Saxon, Executive Director
USC Center for Body Computing

U of IL Chicago College of Medicine, Fall 2016

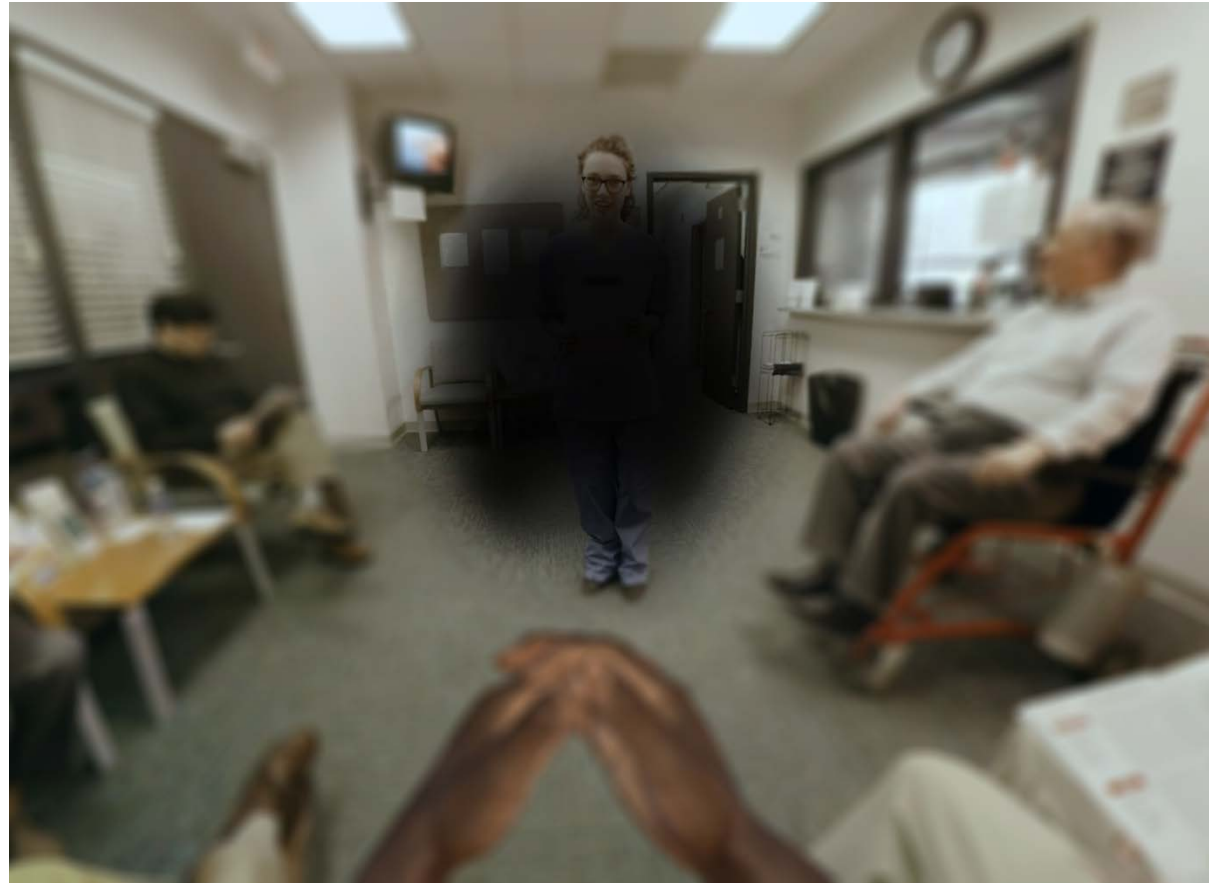


Pilot Study

- 91 study participants
- 2nd year medical students
- Essentials of Clinical Medicine Course
- Geriatrics Workshop

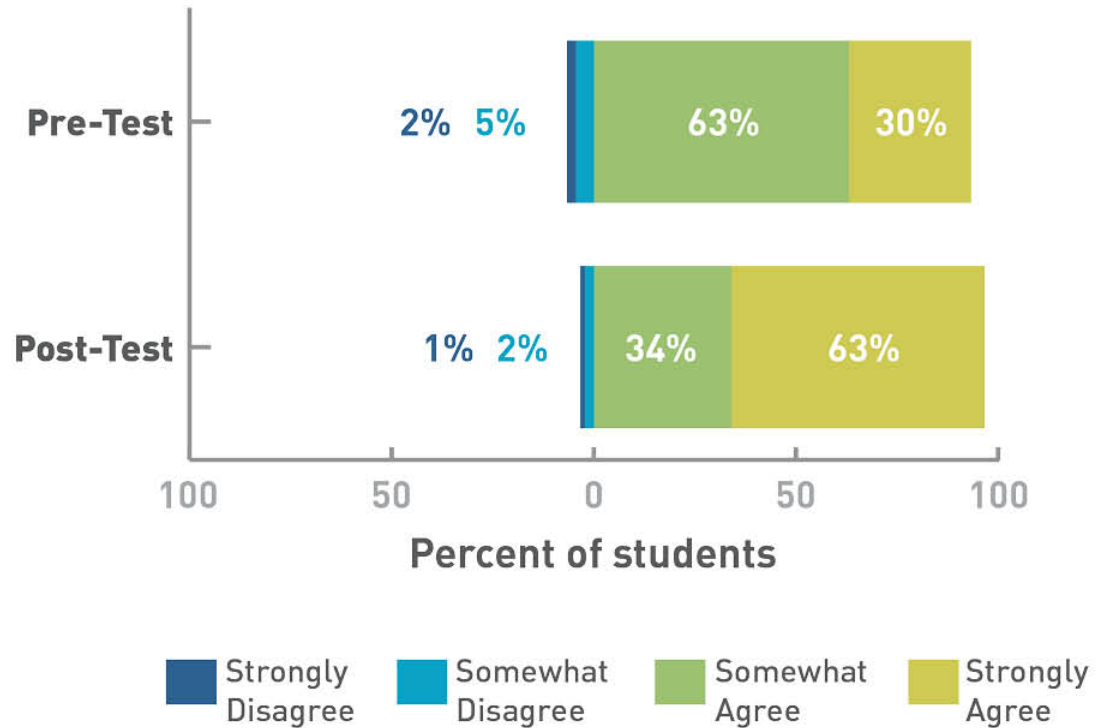
Body perception augmentation

1. Hands as controller
2. Vision & Hearing Impairments
3. Storytelling: race, age, gender, interactive elements



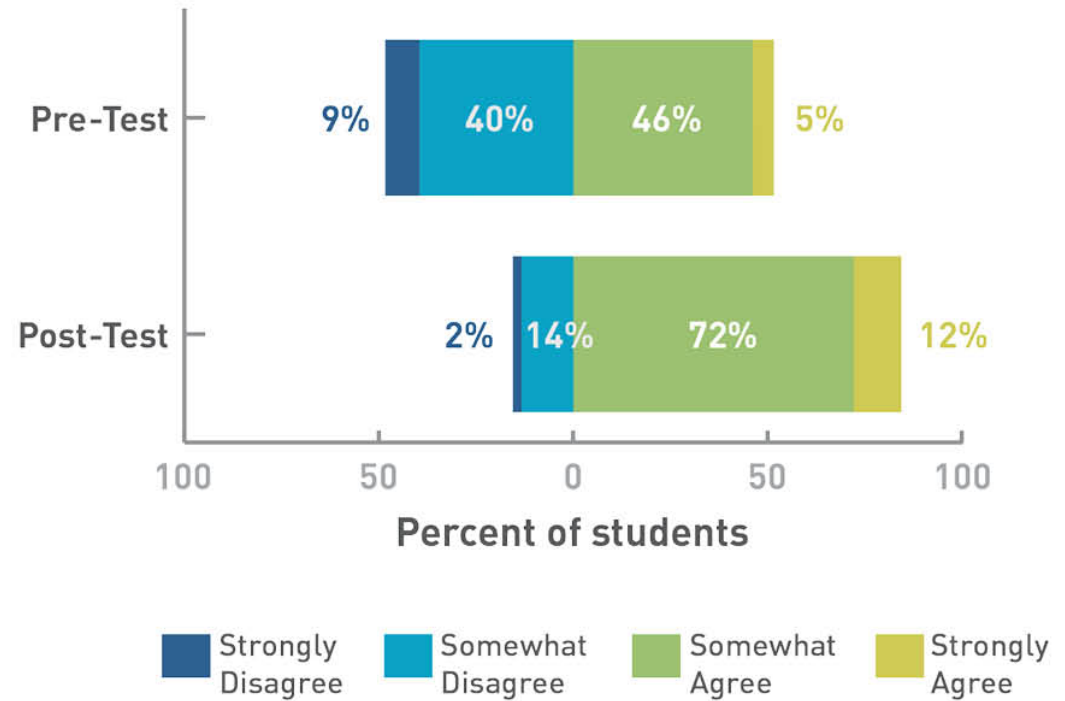


AGREE/DISAGREE: “Embodying my patient in VR helps me learn concepts important to my career.”



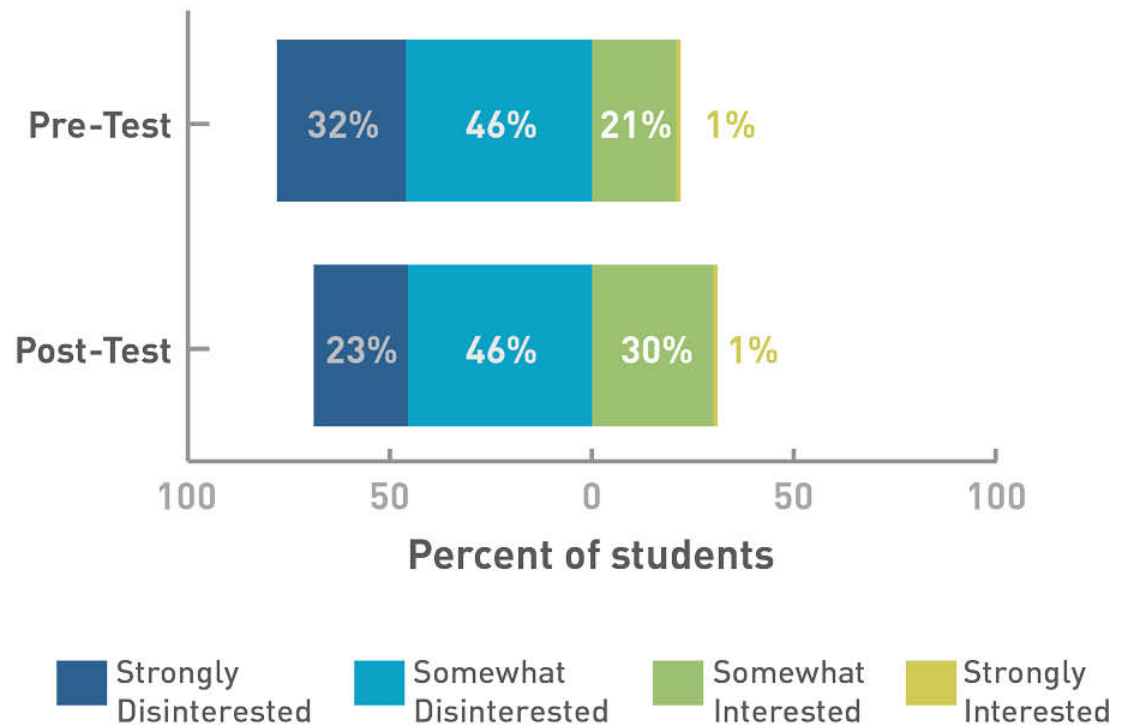


AGREE/DISAGREE: "I understand the perspective of an elderly patient."



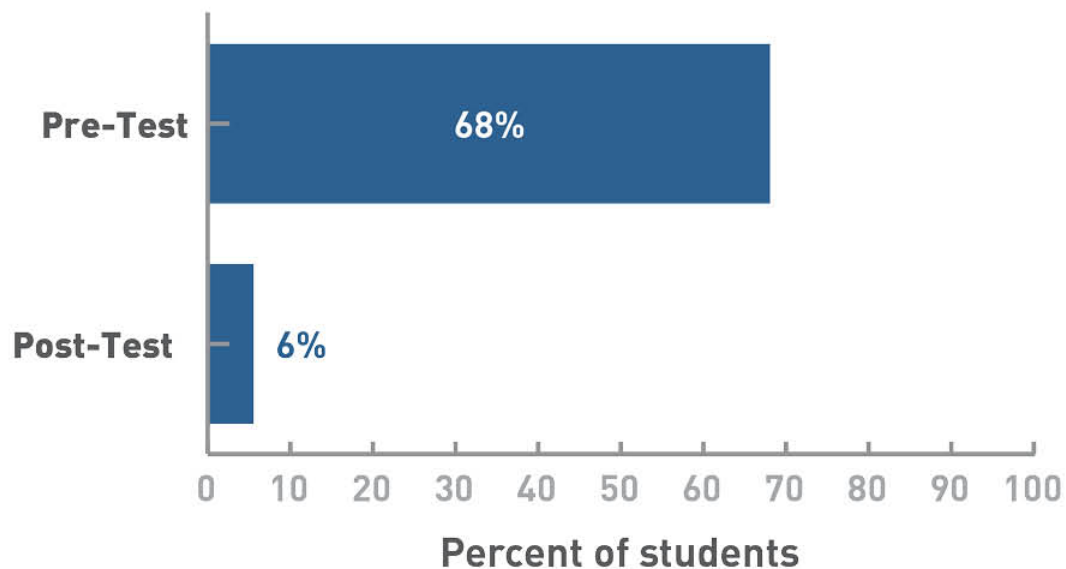


Interest in pursuing a geriatrics specialty





Use of stereotypical words to describe older adults



Common stereotypical words used: old, frail, grandparent, white hair, nursing home, sick, wise, respect, slow



Reactions

- “What’s wrong with this headset?!”
- “Can you turn up the volume?”
- Surprise & frustration at struggle to complete cognitive test
- Sensory vs. cognitive impairment
- Posture changes



Outcomes

- **Motivation to pursue a career in aging**
- **Assess audiovisual status when diagnosing cognitive impairment**
- **“This was the best 6 minutes I spent in our entire geriatrics unit!”**
- **Unanimous agreement for more simulations like this one**



EMBODIED PATIENT EXPERIENCES

- **The Alfred Lab**
Macular degeneration & high frequency hearing loss
- **The Betty Lab (Arriving August 2017)**
Alzheimer's disease

DOCUMENTARY SERIES

- **Macular Degeneration (Arriving May 2017)**
- **Alzheimer's Disease (Arriving June 2017)**

Partner content will be available soon.



Forbes

“This app...will change how we treat patients by providing an immersive experience that creates emotional intelligence and ultimately more compassionate care.”

- Dr. Leslie Saxon, Executive Director

University of Southern California Center for Body Computing

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Thank you!

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