



# What Really Happens When You Put Virtual Reality in Schools

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# What is foundry10?

Educational research organization

Focused on non-traditional learning

Projects with preschool through college-aged

# Our work in VR

Focusing on applied settings

Putting VR in the hands of more teachers and students

Supporting educators to explore untapped ideas and uses



# Coming up...

Exploring learning and cognitive development in VR from 30 schools

Use cases and requests from actual kids and teachers

Psychological/ethical considerations for use with students



# Demand is high for VR content in education



## Educational communities are excited about VR and we need more stuff.....

# Round 1: Pilot Study with DK 2's

Local teacher, computer science

Ended up with five DK 2's

Students as content creators





# Round 2: Seven school study

Middle & High School

Focus on:

- Implementation

- Challenges

- Classroom

- Management



# Round 3: A much larger group

Current study has 19 schools and we work with about 7 additional partner schools

Focus on:

- Presence and Immersion

- Perspective taking

- Perceived value of content



# What we are gathering

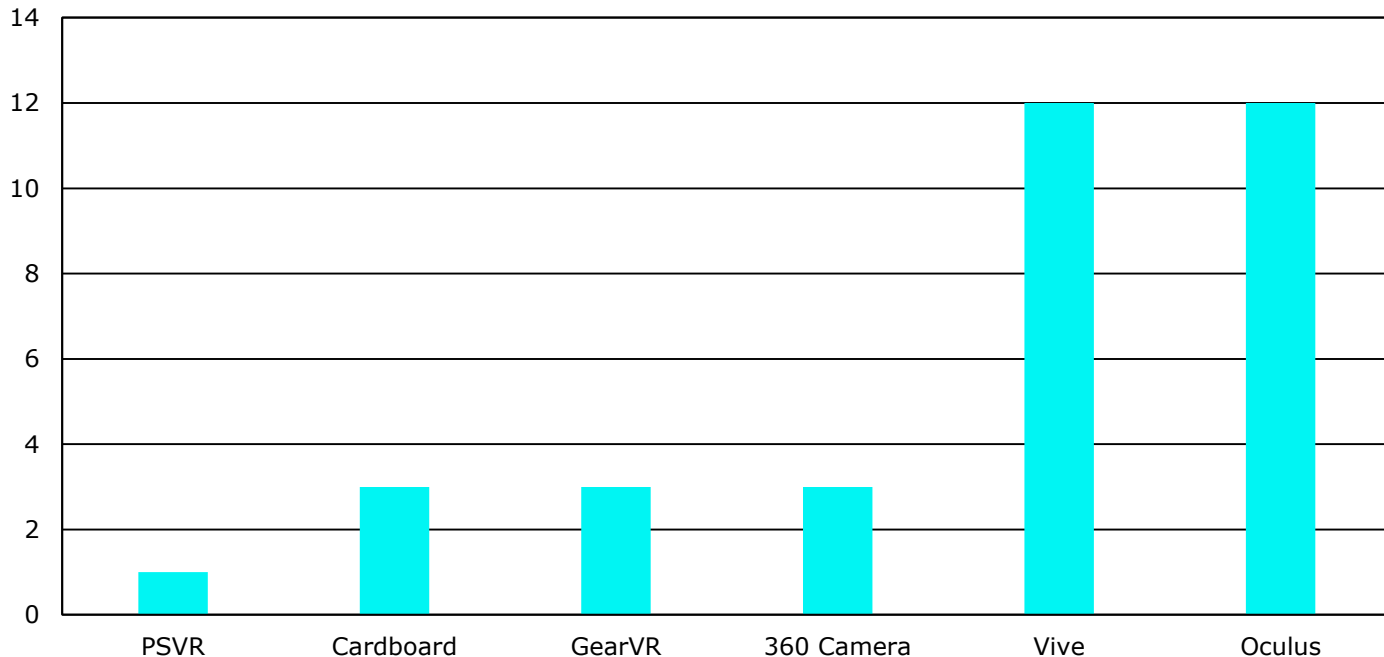
Educator interviews, student surveys

Partner VR schools, not in the formal study

External university education partners

Sponsoring other VR events for college

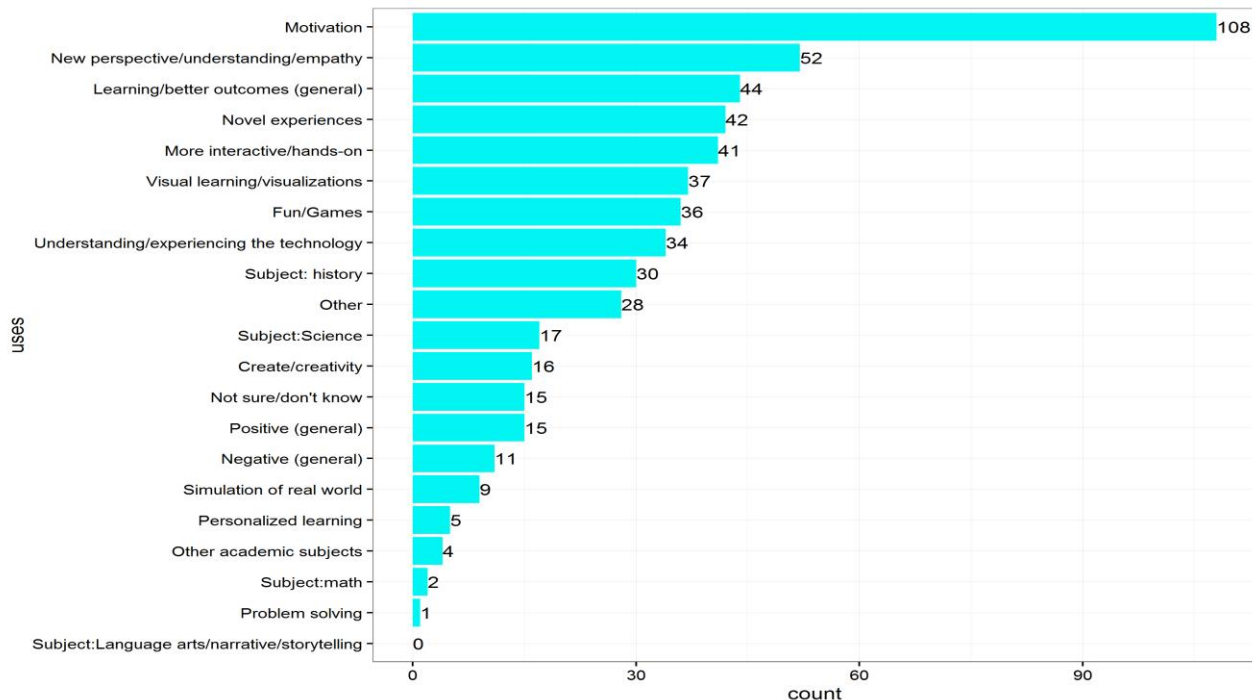
# Gear breakdown (19 schools)



A person with long dark hair is wearing a black VR headset and a black t-shirt. They are holding a black VR controller in their right hand. In the background, a large monitor displays a game interface with a dark scene and many small, colorful, glowing particles. The monitor is mounted on a light-colored wall. A blue semi-transparent banner is at the bottom of the image.

Kids

# The potential kids see (usage)

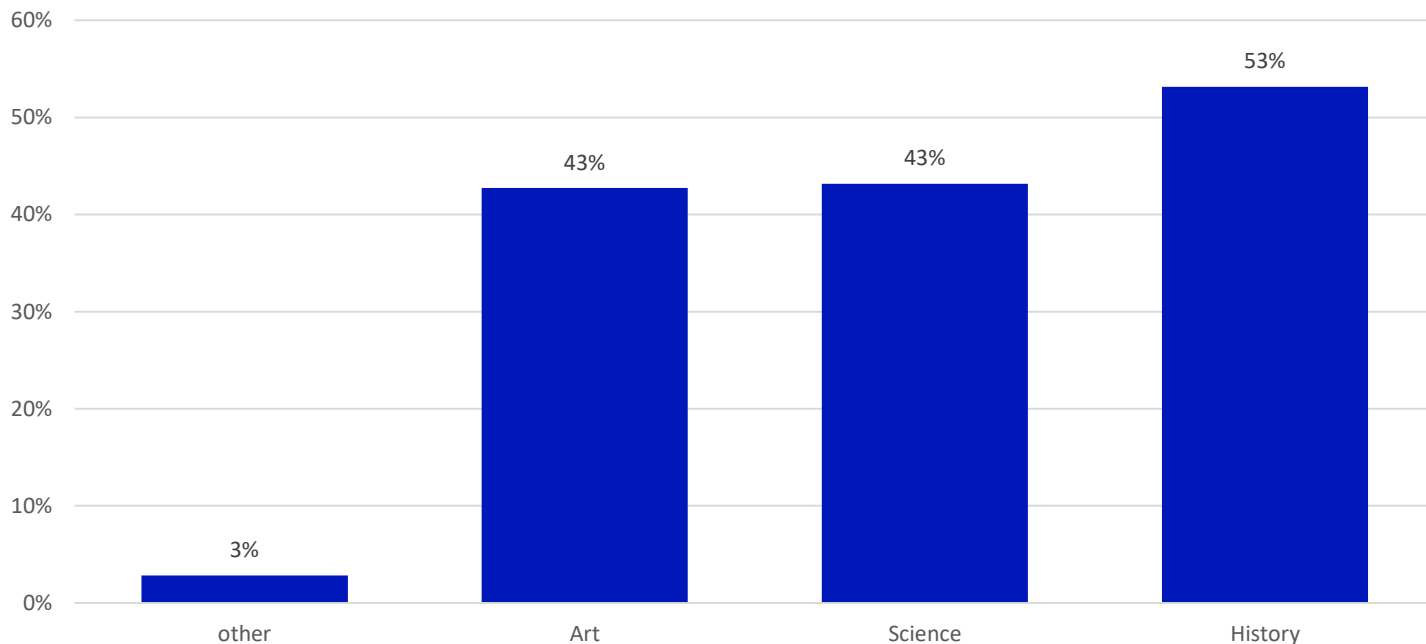


# The potential kids see

*"I think students would remember things better if they actually got to experience them for themselves."*

*"I would like to experience life in a different world. Not only use VR as a project for learning but also a change to get away from life if even for a moment and experience a new reality."*

# The potential kids see (subject)

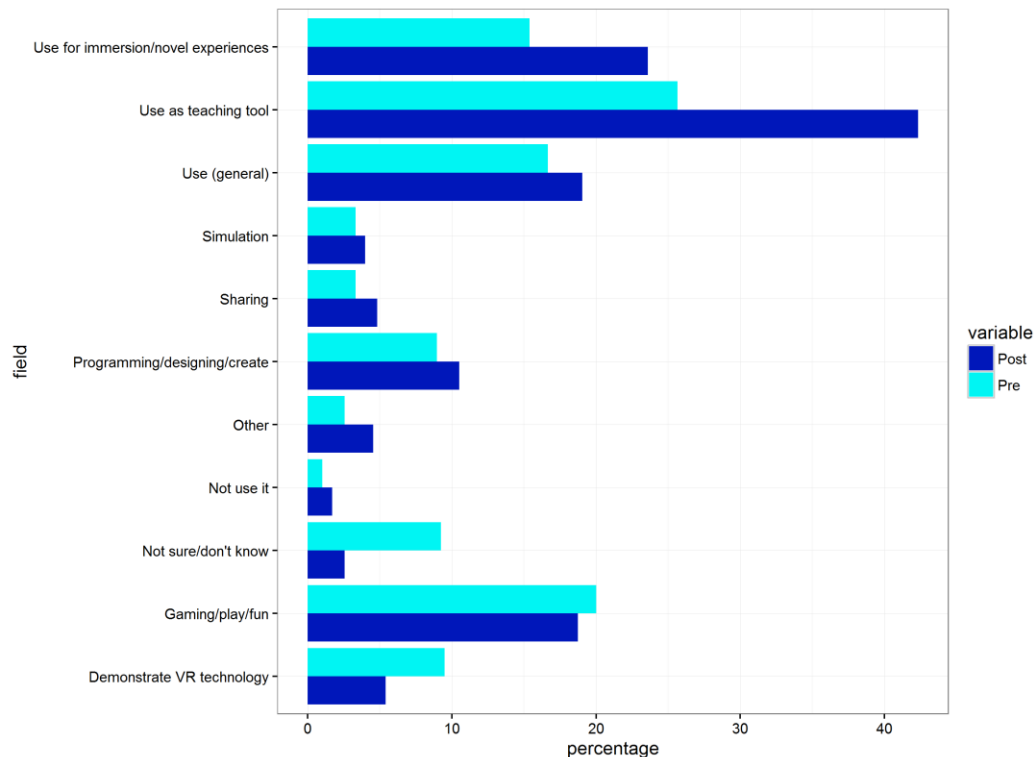




# Shift over time

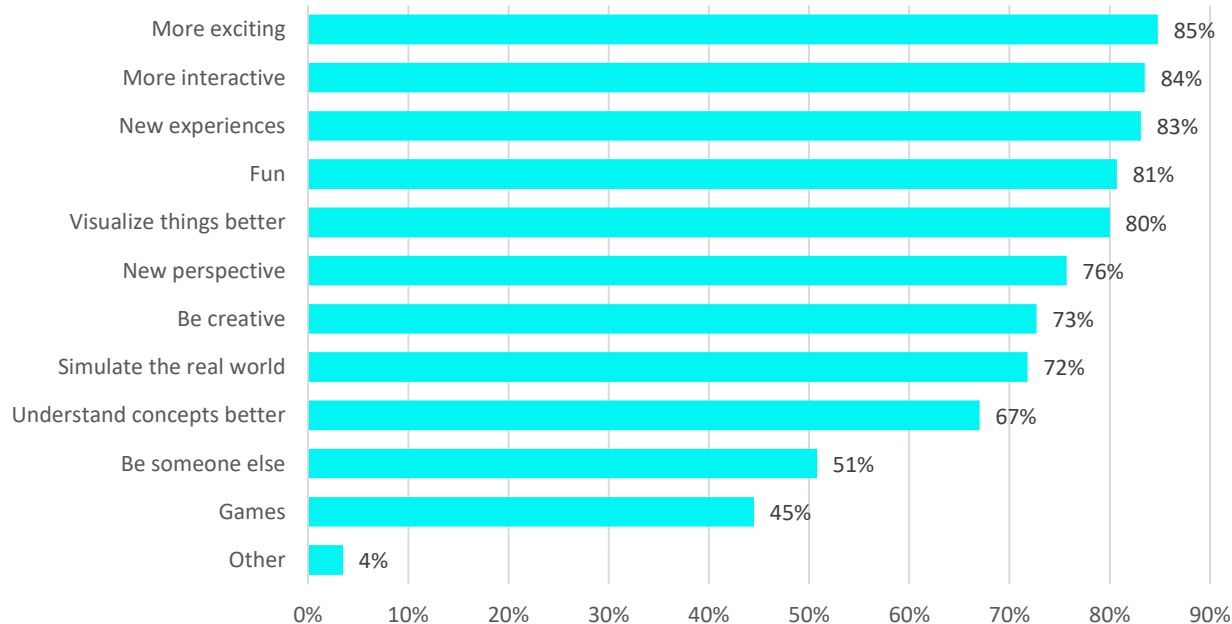
Sharpest increase in seeing it used as a teaching tool

Slight drop in using it for gaming



# Importance of interactivity

*Students were asked "why might VR be valuable for learning?"*



# Kids don't want us to screw this up

They literally said, "Don't screw this up."

They don't want digital textbooks

They don't want moving diagrams

They don't want VR lectures

# Not for everyone...

*"I think that it is a cool experience but it should not be incorporated with everyday lessons. Students need to learn social skills and communication that is not based on technology"*

**The less  
I care,  
the happier  
I am.**

# Misconceptions we hear about VR

Isolation

Too hard to manage

Games platform

Kids will just goof off



# It turns out...

Students share experiences

Scaffolding helps manage

Huge Breadth of content

VR is more compelling



*"I was literally floored"  
– high school student*



# Kids want developers to know...



They want to  
personalize and  
impact the  
experience  
around them

# Kids want developers to know



# They will suspend disbelief...if it makes sense

# Kids want developers to know

They learn about new content through their favorite YouTube personalities

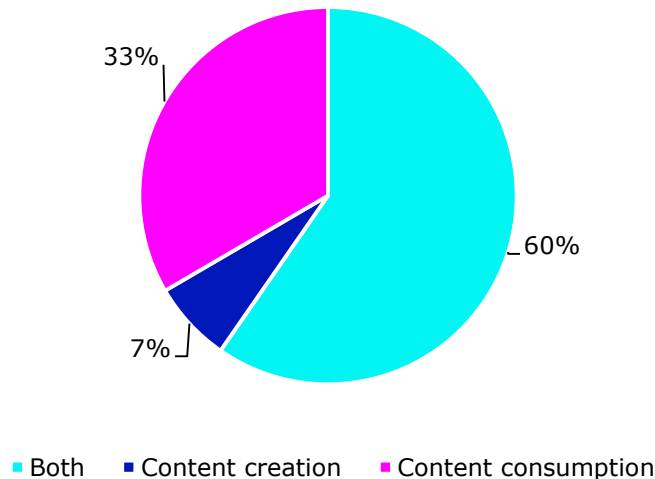


# Kids want developers to know

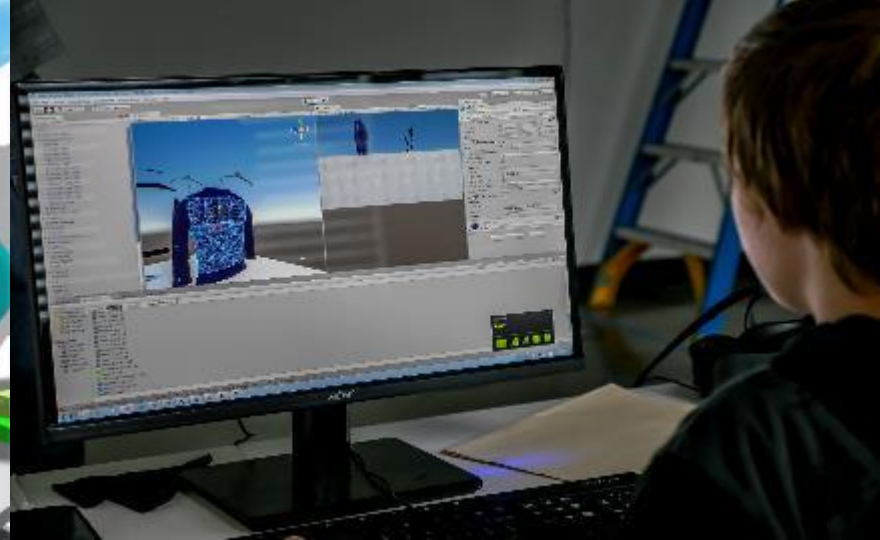
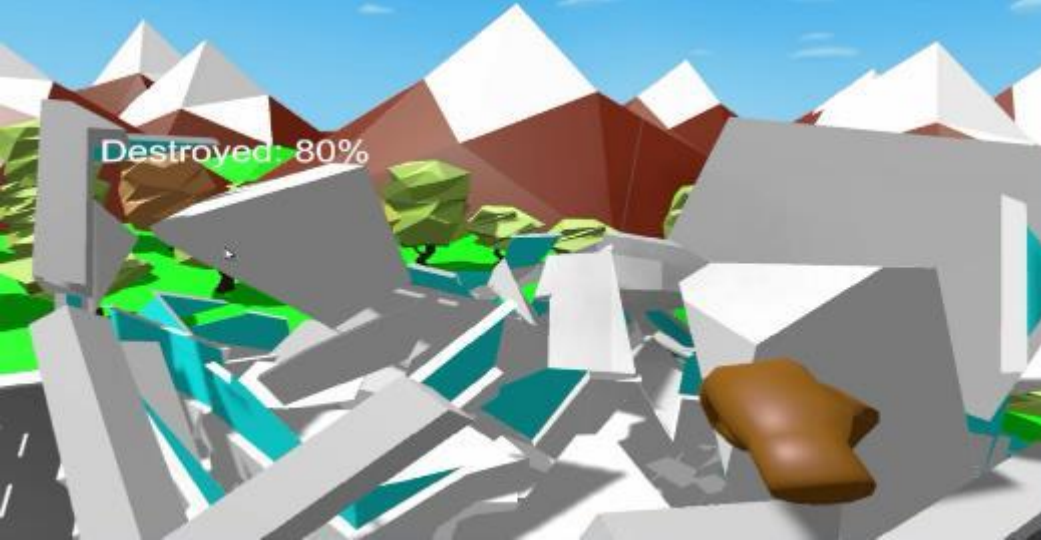
They aren't just thinking about playing games.

They are thinking about what it means to make them.

**Interest in content creation vs. consumption**



# They are making content too







Teachers



# They are just as excited as kids





They just think about different things

# Getting educator buy-in

Often times you need a teacher to champion VR in a school or district

Or, buy-in has to already exist



# Teachers want developers to know

VR presents ways to explore an abstract concept of reality

*"We are using an almost sci-fi technology... I want them to break that [reality] and manipulate it in a way that creates another type of experience."* – Middle-school art teacher

# Using VR as an equalizer

Providing students access to things they wouldn't normally

*"We are a rural, high poverty area, to go to Walmart is a big deal to them. An experience as mind-blowing as VR is so far off."*

Can VR level the playing field for student experiences?



# Enhancing meaning through simplicity



## Simple things like scale can create and sustain wonder





Teachers want developers to know

Being a part of the story brings huge meaning to students

# Teachers want developers to know

You do not have to  
spell everything out

Part of learning is  
grappling with the truth  
and trying to address  
misconceptions



# Teachers want developers to know

This can be a medium that draws in kids that are not engaged with traditional learning

*"I am an extremely visual learner, so my hope is that virtual reality will help me visualize whatever it is I need to learn about"*

# It's important to engage the non-immersed



KTSNE

Advanced headsets  
offer advanced  
engagement

Sociable experiences

# Management

Multiple students  
engaged

One student immersed

Different hardware,  
different solutions



A person wearing a VR headset is shown in profile, looking down at a glowing yellow line in a virtual environment. The line starts from the left and curves downwards. In the background, there are stylized, translucent figures of people. The scene is dimly lit, with the primary light source being the glowing line.

Teachers want developers to know

VR can be used to explore new creative methods and outlets





Psychology, learning and technology

# From a cognitive standpoint

## Key pillars of learning

Active

Engaged

Meaningful

Socially interactive





# Cognitive load

The amount of information working memory is able to hold at one time (Sweller, 1988)

To “learn” information, we need to transfer new knowledge into our long-term memory

Different types of load...some of which are distracting and take away from learning

# Cognitive overload

A great paper on this is:

Design of Interactive and  
Dynamic Anatomical  
Visualizations : The  
Implication of Cognitive Load  
Theory



# How VR can help

Part of what is intriguing in VR is that it might lessen cognitive load

But we need to be thoughtful about the design

Student feedback here is really, really helpful

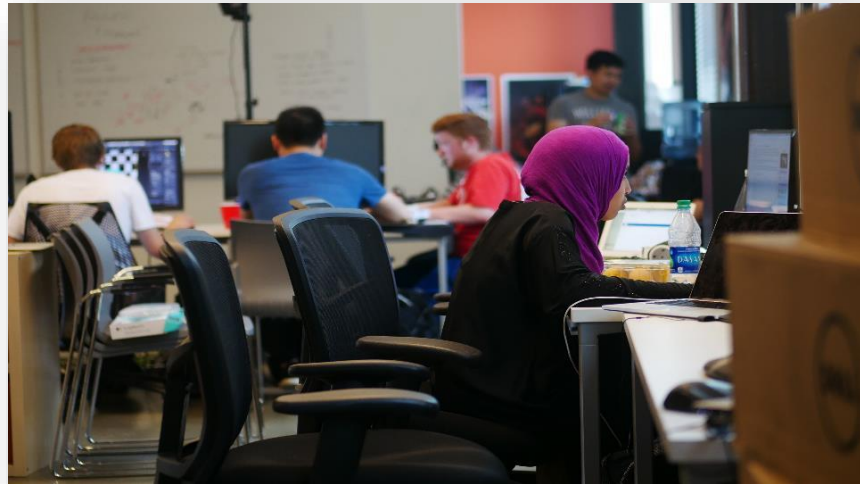
(Regian et al, 1992; Pantelidis, 2010; Winn, 1993; Psotka, 1995)

# Engagement is not just a buzzword

Whitehall et al, 2014, *The Faces of Engagement*

Using facial recognition, they detected how student "engagement" during a class

Engagement found was a good predictor of student performance



# Virtual people and student rapport

Research challenges the idea that education has to be serious, formal

In fact, children better connected with virtual people that spoke more informally and would joke with them and retained more info.



# Virtual people and student rapport

The social element of connectivity, even with a virtual agent is a key component for learning

(Ogan et al., 2011; Ogan et al., 2012; Sinha & Cassell, 2015; Finkelstein, et al, 2013)

How might we consider these elements in VR?

# Immersion and Presence

“Technological immersion has a medium sized effect on presence.” (Cummings & Bailenson, 2015)

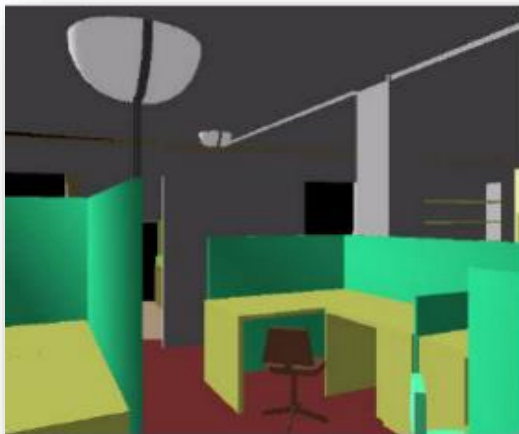
Immersion – the technological quality of experience

Presence – the psychological experience of being there

# But how present are we in reality?

Interesting study: “Using Presence Questionnaires in Reality”  
(Usoh, et al. 2000)

Considering the idea that “being there” is the ability to act there.





# What did they find?

Questionnaires designed to measure presence should undergo tests with actual reality

However, there are some useful takeaways when thinking about design

- Again, that social impact of others in the virtual space

- Normal things we may ignore: background noise

- The interactive element...my actions make a difference

# Virtual places vs. virtual people



# Researchers want developers to know

Talk and playtest with people who understand learning

New media can be ineffective if designed without learning expertise



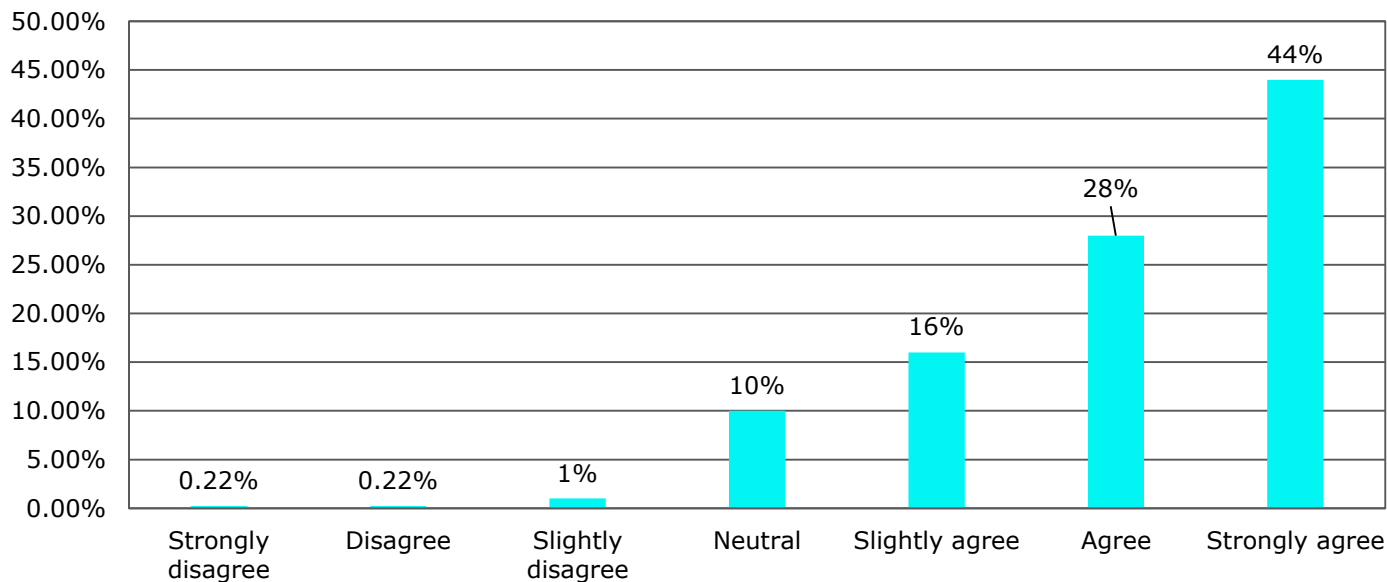
# Accuracy



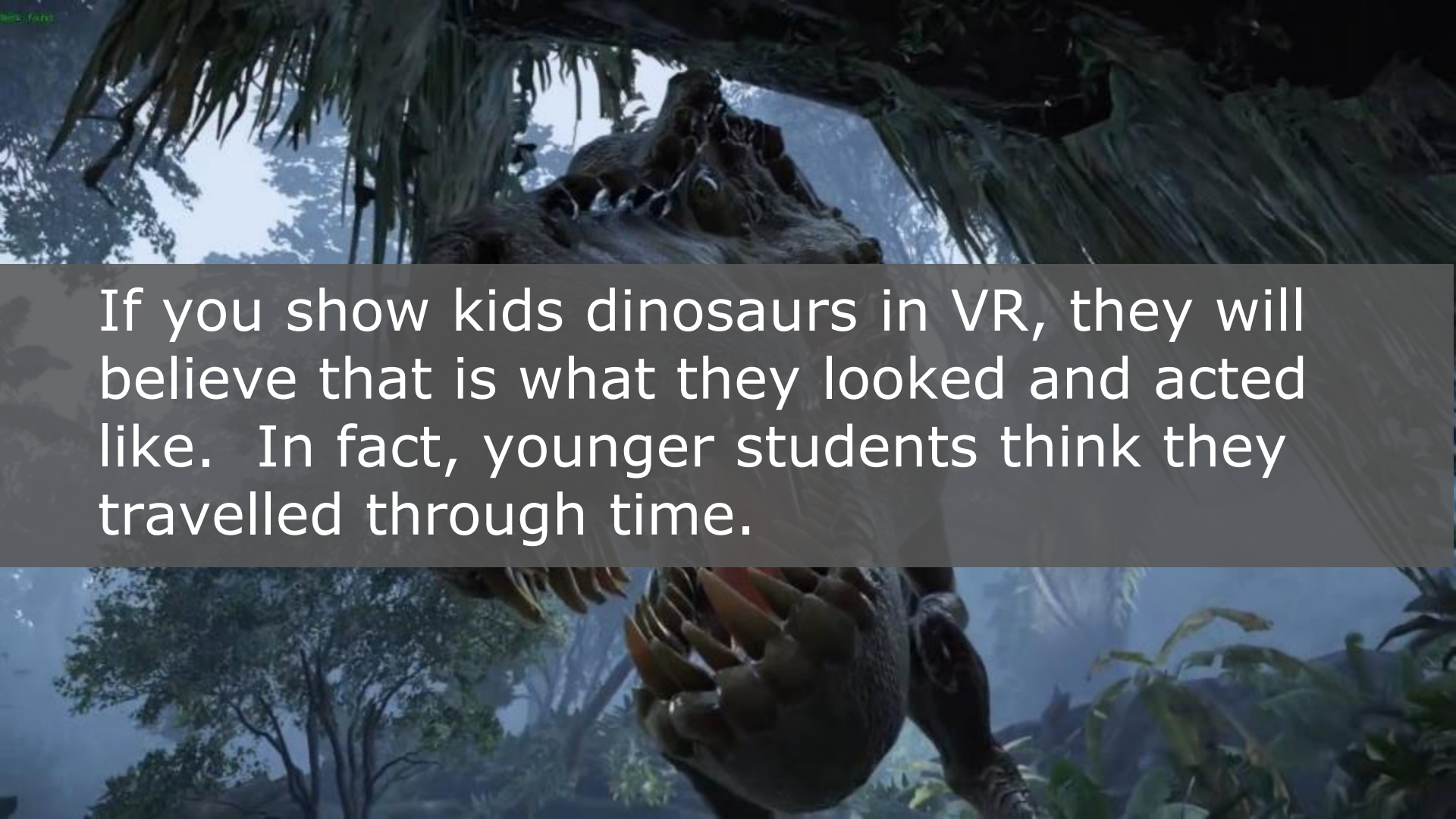
# You might not know this, but...

Teachers, students, parents,  
administrators, etc... all think you really  
know what you are talking about

# Developers are knowledgeable about the subject they are creating for...







If you show kids dinosaurs in VR, they will believe that is what they looked and acted like. In fact, younger students think they travelled through time.



An aerial, high-angle photograph of a dense urban landscape, likely New York City. The image shows a variety of skyscrapers and buildings, with a prominent dark, textured tower in the center. A digital clock overlay in the top right corner displays '08:48' in a black, segmented font within a white rectangular frame with a black border. The bottom of the image is partially obscured by a magenta banner containing white text.

08:48

Conceiving different perspectives

# Differing viewpoints on what constitutes accuracy

*"You want students to wrestle with content. Present as much truth as possible, but at the same time you want them to put the truth together."* – High school teacher

# Technical vs. historical accuracy

Tech teachers  
evaluating experiences  
with students

Humanities teachers  
looking to offer new  
perspectives



# Ethics and classroom VR use

Ethically using VR to help students

Safe spaces, mindfulness and suicide prevention





Putting VR in real classrooms

# How are teachers funding VR?

School grants

School foundation grants

Go Fund Me

Donors Choose

Utilizing other courses: Computer building



# Subject areas... revisited

Social studies, social studies, social studies

Science

Foreign language

English and the narrative story

Math is in demand, but we have yet to see it done

*Giant*

Concluding thoughts

# Low hanging fruit

## Getting past the Magic Schoolbus

Kids want to be more than just observers



# Snapping back to (real) reality



What breaks the sense of presence in schools settings

Audio can provide a barrier to breakage



# Playtest, playtest, playtest

Playtest data and feedback from real students is a rarity

Go out and get it





# Our website

[Foundry10.org/subject-areas/virtual-reality](http://Foundry10.org/subject-areas/virtual-reality)



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