



Designing VR Content with Students in Mind

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foundry10

- We are a philanthropic educational research organization
- We run programs for kids/teachers, do applied and experimental studies
- Our goal is to expand the ways in which people think about learning



Goals for today: VR and Learning Concepts

- Cognitive Load (a really important concept for VR)
- Personal space and VR
- The impact of audio
- Kids and developers



Why this information is important

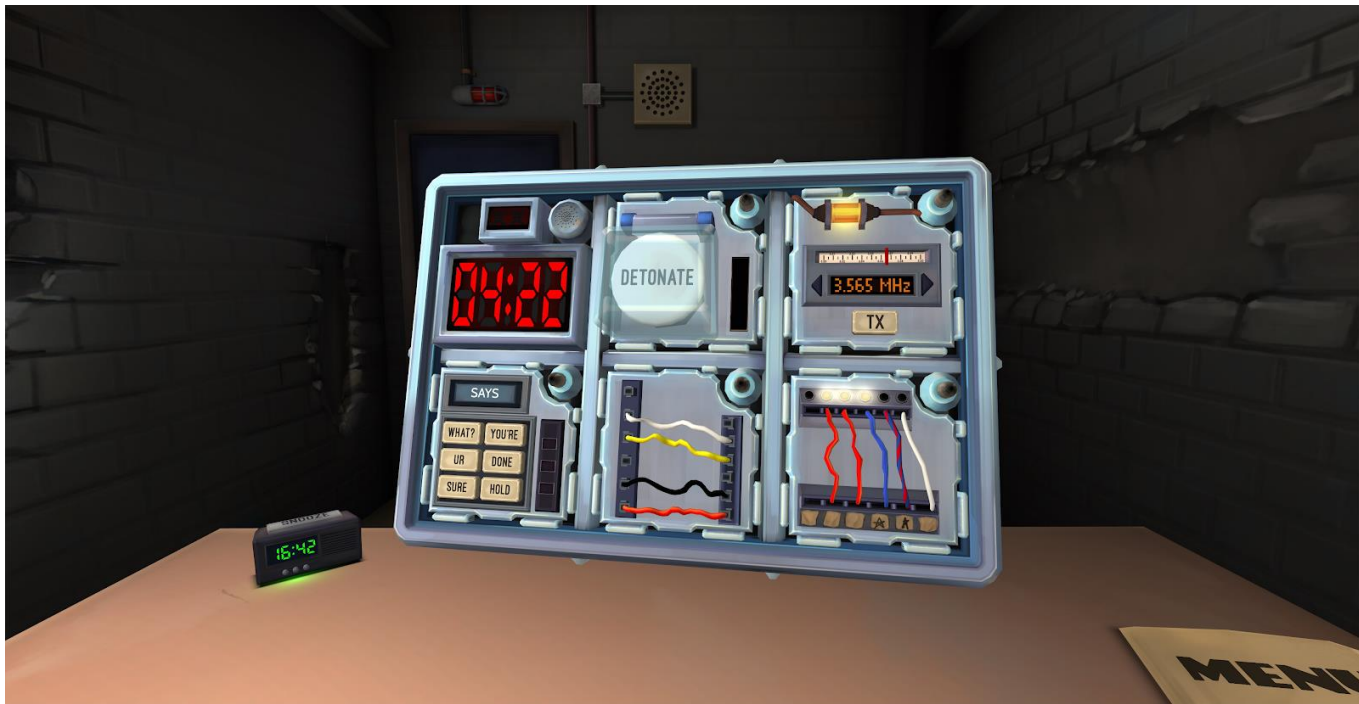
- VR for education is hot right now
- Our research shows VR for learning is pretty complex
- If the goal is to have people learn from VR, we need to think about the ways in which VR may improve AND complicate learning



“We have learned that improving education is not a simple matter of adopting a new technology.”

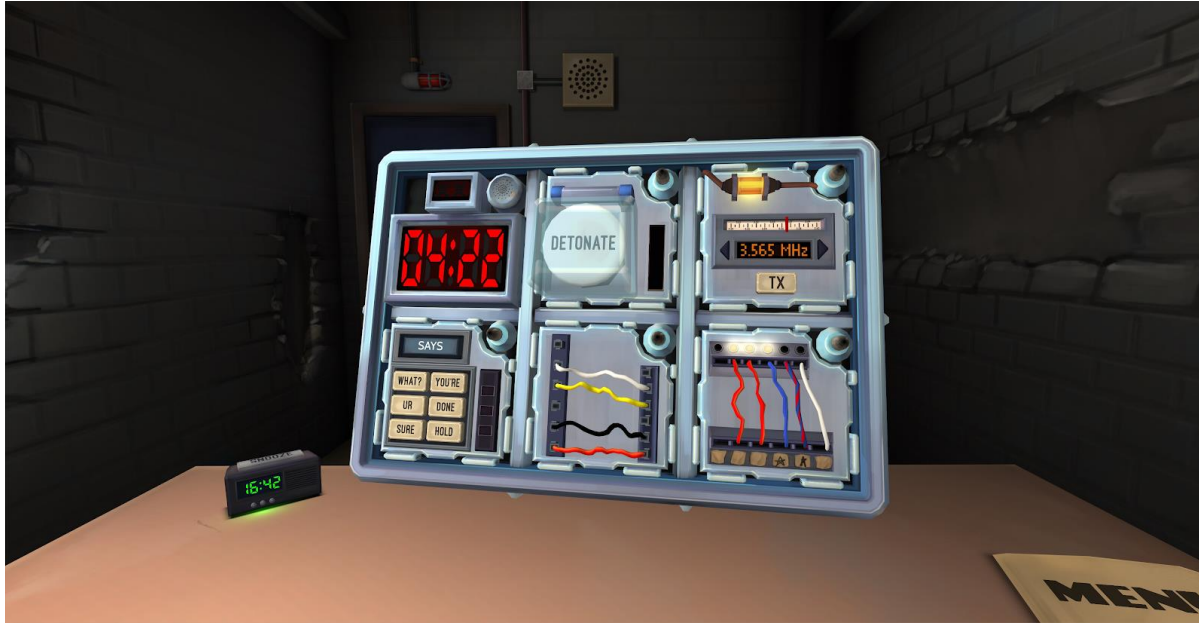
-- Hegarty, 2004

Cognitive Load





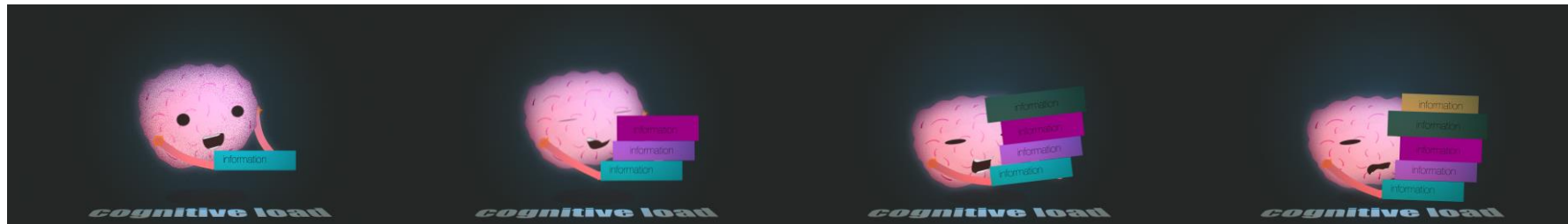
How we organize new information matters



Complexity and expertise-how big of a chunk can you handle?

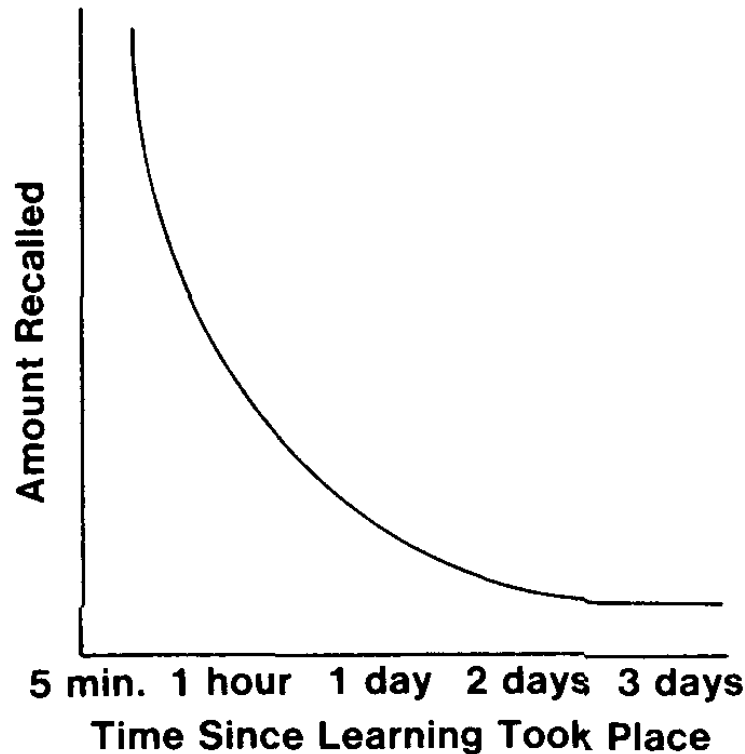
Cognitive Load

- We have a limited amount of working memory
- And how info is presented impacts how much we can hold!



Cognitive Load

- As new information presented to us increases, the ability for us to remember and work with it rapidly decreases



Why does it matter?

By considering a few key principles from cognitive load theory, your content may be more effective and useful to learners.

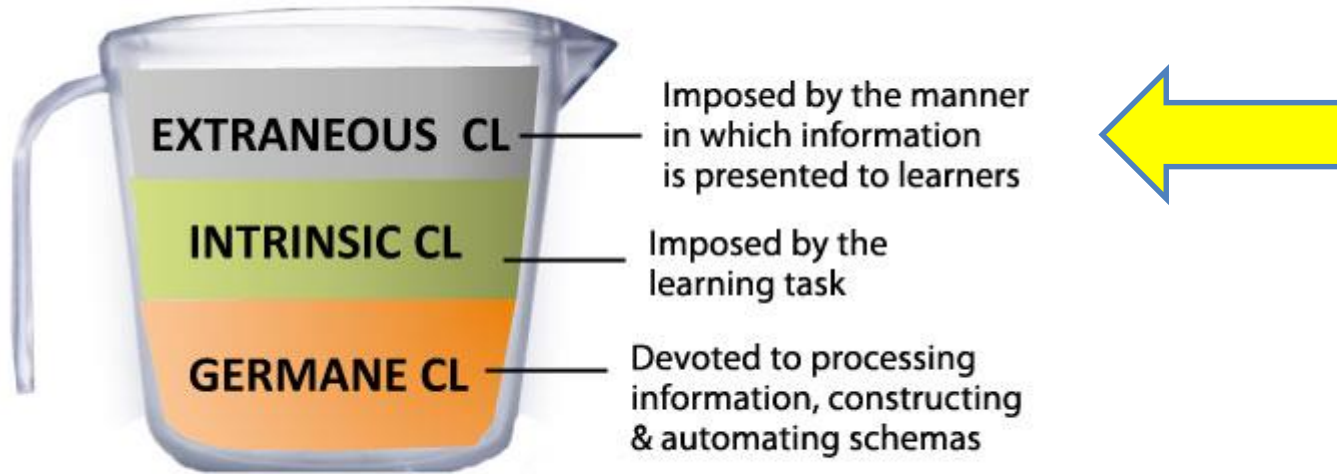


Additionally...

- Virtual reality has the potential to actually *decrease* load for learners, making concepts more understandable and digestible.
- But the opposite is true as well!



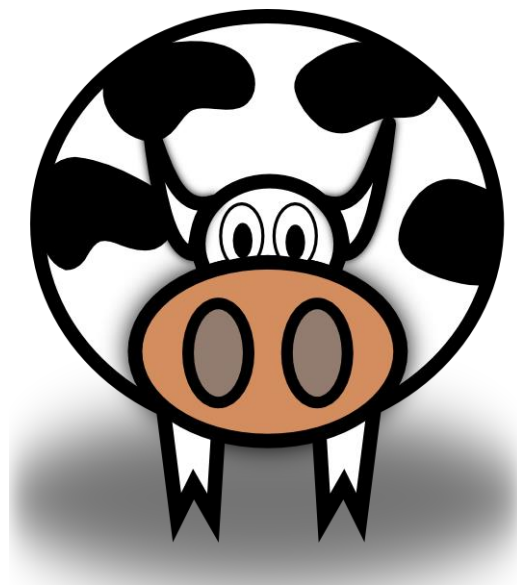
There are three types of cognitive load



Cognitive Load

- Designs that create extraneous cognitive load are harmful for learning
- What is “relevant” should be clear!

It might seem flashy and exciting, but if they are not actively engaging with the meaty part of your content, they are not learning!



What am I supposed to pay attention to??

The more skilled a person is,
the better they are at knowing
what is relevant and what is
not.



Look here

Scientific Effects that Impact Processing



Modality Effect



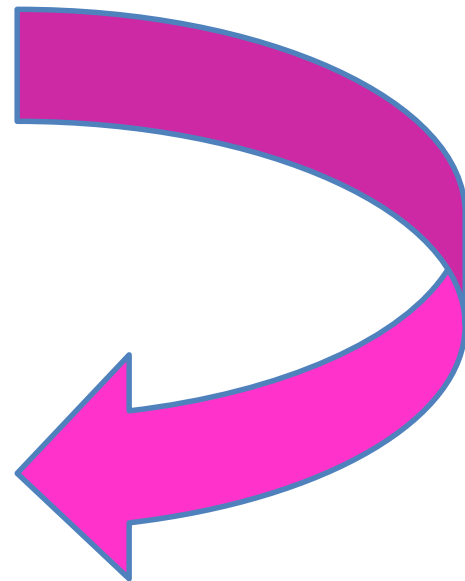
The Transient Information Effect

- This is a loss of learning when information disappears before a learner has a chance to process it
- It can happen with animations and VR
- In VR, someone can be looking somewhere else and miss the information

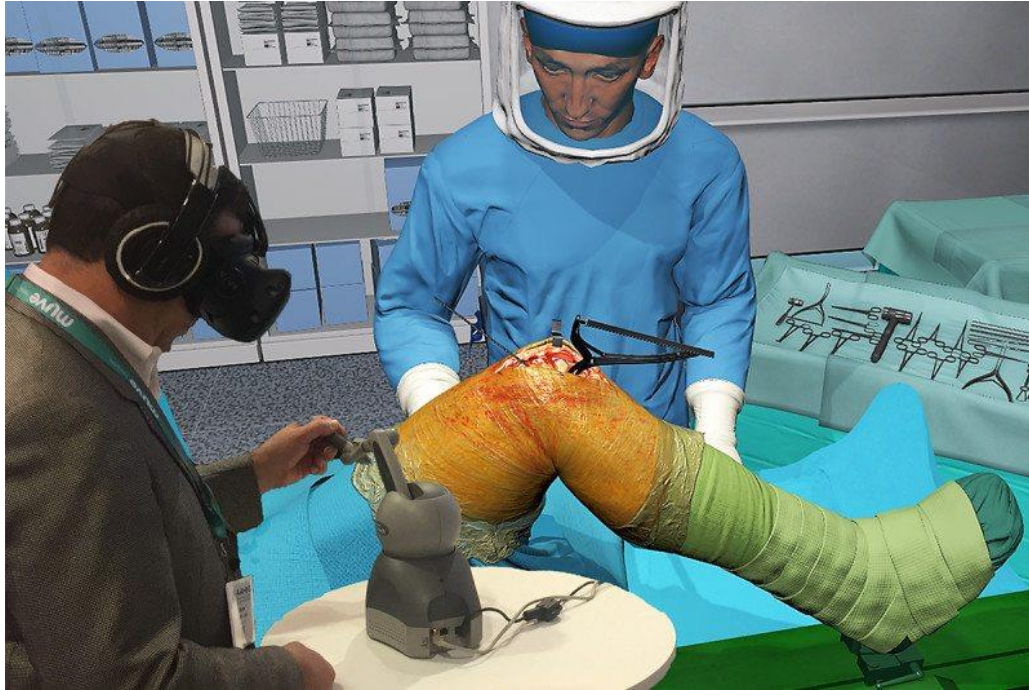


The Expertise Reversal Effect

- Advanced learners cannot ignore redundant information
- They will try to connect that info to what they already know
- This can actually cause them to make more errors



Movement and Learning

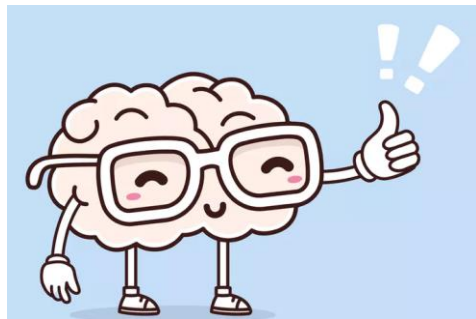


Doing simulations in VR can reduce the cognitive load of doing that thing in real life.

Cognitive Load

Key things to consider with design:

- The amount of control the user has over pacing
- Speed of animation transitions
- Pre-training
- Provide cues to help users focus
- Ensure strong alignment between our objectives and what users will attend to

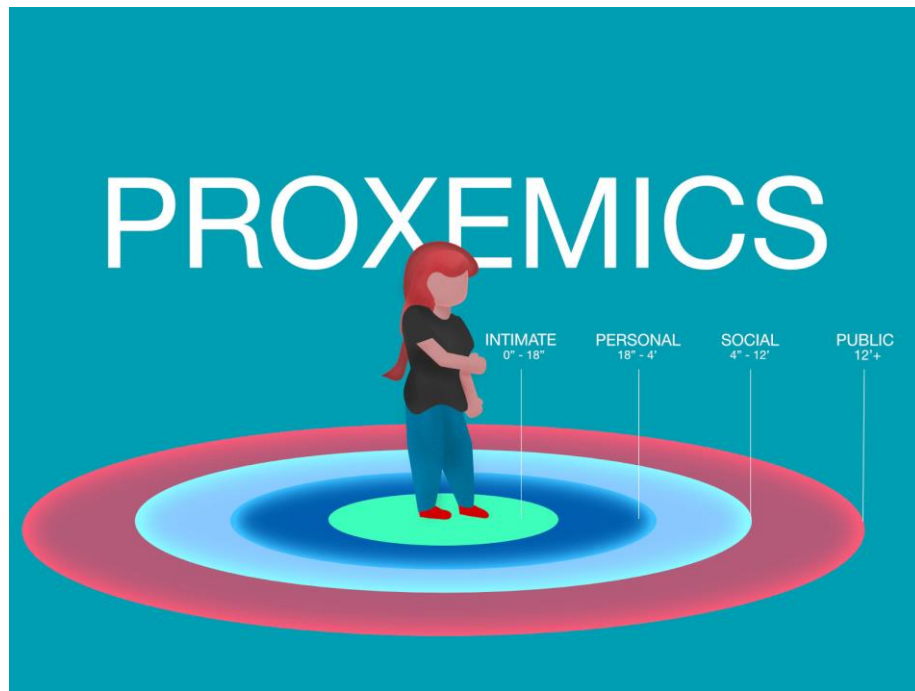


Additional good things to consider

- Making sure audio & visuals inform one another
- Segmenting -- smaller chunks can be better than one long experience
- Overlapping information (redundant information)
- Watch out for too much extraneous input (narrator, music, visual imagery, words)

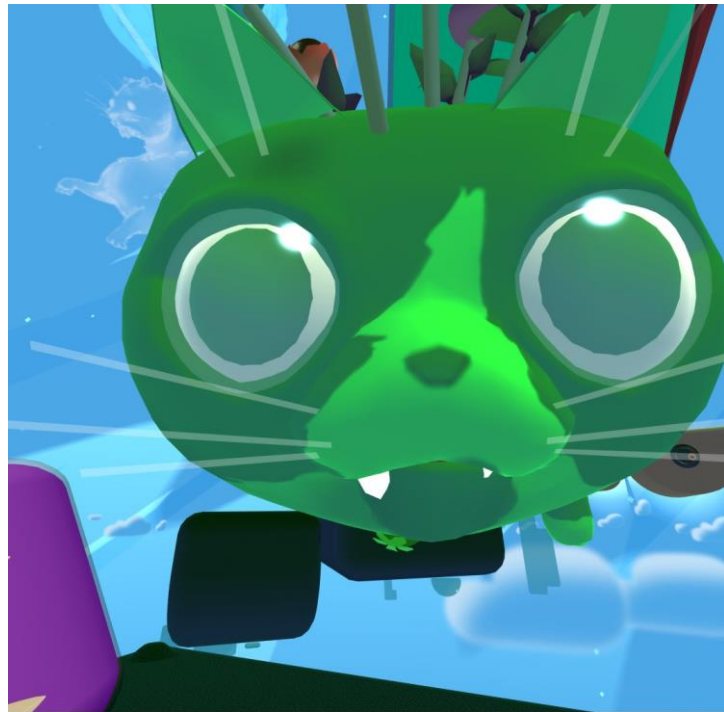


Movement in VR

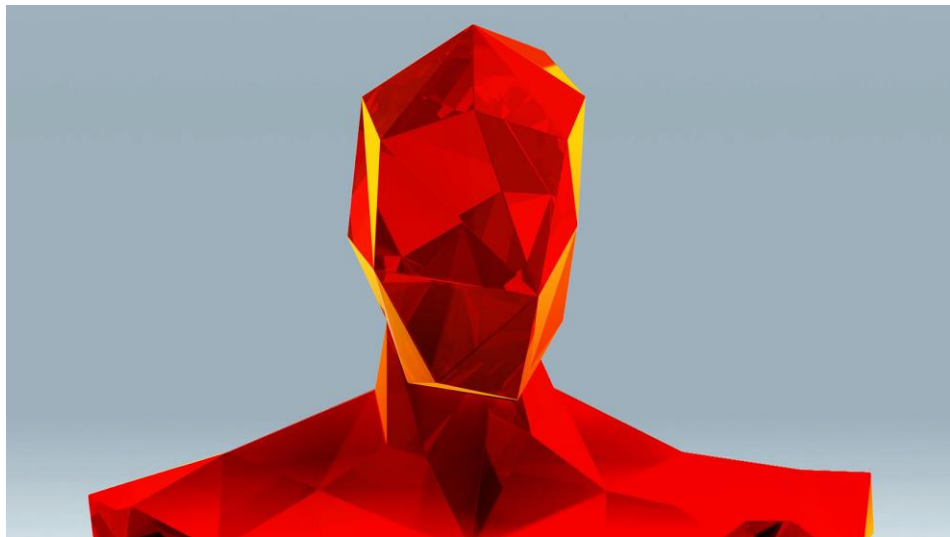


Proxemics

- In many VR experiences, the user cannot control what comes towards them, the speed it approaches or how to get it to move away.



Design Implications from Proxemics



- Allowing the user to approach
- Controlling the speed at which things do approach
- Being careful with living things approaching the user

Audio in VR

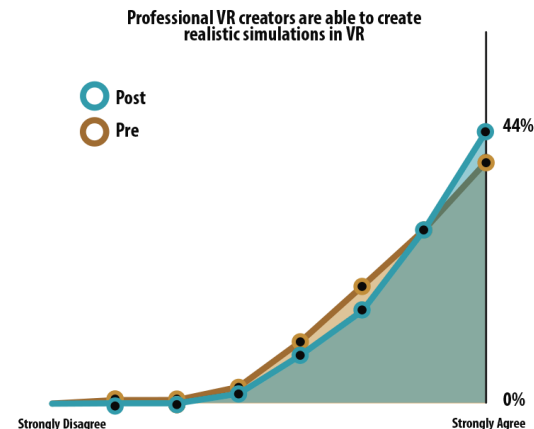
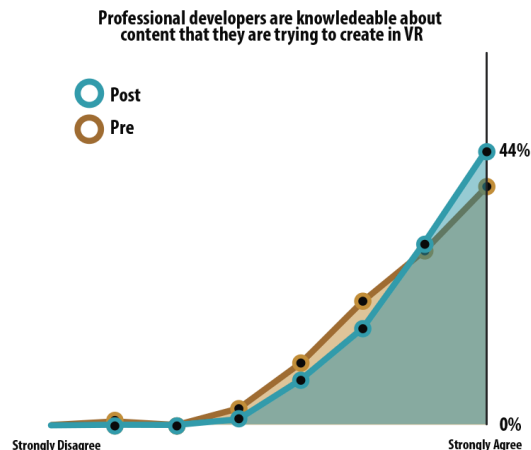
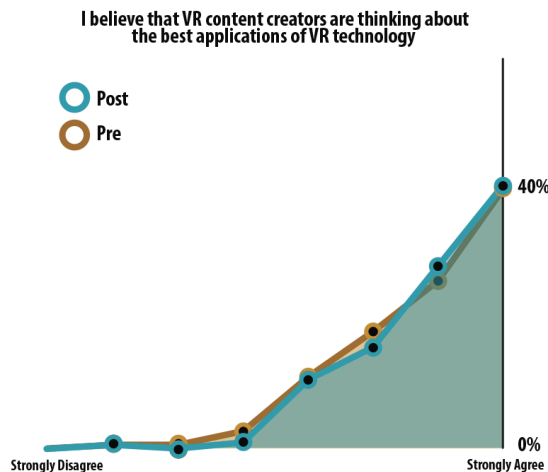


Questions for further exploration in audio

- What is the additive effect on user experience of different types of audio?
- How “real” does audio really need to be for users to benefit from the experience?
- What type of audio elements work best in educational settings?



Students Trust in Developers



Resources

If you are interested in learning more about VR in education, you can find resources on our website at

<http://www.foundry10.org/>



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