Abstract—A 20-minute seminar “The Creative Process of Making an Animated Movie” was presented to 51 participants. The creative process was designed functionally identical but with varying aesthetics and contexts within three VR learning spaces: two situated learning spaces—imagine a lightbulb art gallery and theatre without artifacts. The third learning space was open spaces of making an animated movie. While these extensions of our visual/spatial capability provide a tangible, observable result, we know that positive affect may promote creativity and suggest that these effects are enhanced through VR affords many new possibilities that extend human capability.

Index terms—Context, priming, immersive, supraliminal, positive affect, anxiety, academic performance, situated learning, experiential, virtual reality, applied computing, education, computer-assisted instruction, human-centered computing, human computer interaction, interaction paradigms, virtual reality

Winston Churchill famously said, “We shape our buildings and they shape us.” While these environments are not quite the same as the ones presented to us in VR, they share some common features with the history of the human-computer interaction landscapes described by Don Norman, the design expert. While these designs share some common features with the history of the human-computer interaction landscapes described by Don Norman, the design expert. While these designs share some common features with the history of the human-computer interaction landscapes described by Don Norman, the design expert.

A. The Nature of Context

“the medium is the message” and similar ideas have been explored by various researchers and design experts. A 1987 study at University of Maryland demonstrated that inducing positive affect improves cognition. While these extensions of our visual/spatial capability provide a tangible, observable result, we know that positive affect may promote creativity and suggest that these effects are enhanced through VR affords many new possibilities that extend human capability.

While these extensions of our visual/spatial capability provide a tangible, observable result, we know that positive affect may promote creativity and suggest that these effects are enhanced through VR affords many new possibilities that extend human capability.

Our results clearly demonstrate the positive effects of these effects within VR affords many new possibilities that extend human capability. Similarly, a 2010 study performed with eighth grade students achieved the same results. While these extensions of our visual/spatial capability provide a tangible, observable result, we know that positive affect may promote creativity and suggest that these effects are enhanced through VR affords many new possibilities that extend human capability.

We conclude with future research considerations and propose further studies. Similarly, a 2010 study performed with eighth grade students achieved the same results. While these extensions of our visual/spatial capability provide a tangible, observable result, we know that positive affect may promote creativity and suggest that these effects are enhanced through VR affords many new possibilities that extend human capability.

Acknowledgments—This research was supported by the Natural Science and Engineering Research Council of Canada.
B. The Power of Priming

Priming occurs when a stimulus (the prime) activates or reactivates a mental representation and influences attention, comprehension, memory retrieval, inference, and potentially influencing all stages of information processing. To improve academic performance, priming efficacy directly benefits the procedural, repetitive simulation capability of VR. When respondents were asked whether they thought the wines sold in the area were German wine or French wine, 73.3% of the bottles of wine sold in the area were of German wine. When German music played, 76.9% of the bottles of wine sold in the area were of German wine. When French music played intermittently, 76.9% of the bottles of wine sold in the area were of French wine. The wines were displayed equally prominently in a music-related to countries of origin.

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C. Learning Theories

The ELT cycle offers opportunities to engage students in authentic experiences where priming effects can be observed in the context of learning. The ELT cycle makes the experience more accessible, and the reflection phase of ELT might seem inherently "low tech", but the procedural aspects of the ELT cycle are well served by the affordances of VR.

D. VR as a “Prime” Enabler

VR offers affordances that address the procedural, repetitive simulation capability of VR. The ELT cycle offers opportunities to engage students in authentic experiences where priming effects can be observed in the context of learning. The ELT cycle makes the experience more accessible, and the reflection phase of ELT might seem inherently "low tech", but the procedural aspects of the ELT cycle are well served by the affordances of VR.
A. Study Overview

We conducted a user study to perform an evaluation of VR's impact on creativity. The study involved 51 participants who were randomly placed in one of three groups corresponding to different priming conditions (17 in each condition). Most participants were university students, and the study took place in Ontario, Canada.

B. Participants

Participants were university students, and the study took place in Ontario, Canada. The participants were randomly placed in one of three groups corresponding to different priming conditions (17 in each condition). Most participants were university students, and the study took place in Ontario, Canada.

C. Apparatus

The apparatus used was the Oculus Quest VR Head Mounted Device (HMD). VR provides the facility to design out barriers, especially in situations where we conduct creative design activities like VR video games.

For designers, VR is an ideal means of increasing marketplace possibilities. It offers the facility to design out barriers, especially in situations where we conduct creative design activities like VR video games. As a social tool, VR provides the facility to design out barriers, especially in situations where we conduct creative design activities like VR video games.

As such, the approach of this study will test the effects of priming on creativity. Prime conditions (17 in each condition). Most participants were university students, and the study took place in Ontario, Canada.

In previous research, we investigated the following hypotheses: (a) There will be no significant difference in situational learning effects, and negative impact on academic performance. (b) There will be no significant difference in situational learning effects, and negative impact on academic performance. (c) There will be no significant difference in situational learning effects, and negative impact on academic performance.
A minute seminar “The Creative Process of Making Animated Movies” was presented in an audiovisual format to the students. The seminar had three conditions: a simple, predictable teaching format; a lecture presented as a familiar and expected experience; and a seminar presented in a VR environment. The seminar followed a pre-determined script and was recorded from a seminar 4 minutes above the main content screen and during the 2-minute seminar, the professor explained the creative process, including examples and artifacts. The second Prime condition consisted of a VR environment that allowed peripheral participation. The seminar was facilitated by an expert producer who shared ideas and examples while the student writers or interns attended the creative process. A stressed-out pre-teen, whose main skills are avoiding school and binge-watching TV, suddenly realizes that she, along with her friends, is destined to save the universe. Parallel Parker is a universe hopping animated hero with a big job; to save the world. Based on your new insights, what would make a good log line for our new Parallel Parker movie?

**Question 1:**
A. Parker is young and fearless and with the help of her intergalactic friends, she is destined to save the universe.
B. A stressed-out pre-teen, whose main skills are avoiding school and binge-watching TV, suddenly realizes that she, along with her cosmic alter egos, must stop an evil supervillain intent on stealing all that is good from the universe.
C. A super-villainy, interdimensional entity decides to wreak havoc on the universe by sucking up all the positive energy, leaving the rest of the universe to slowly rot.
D. A young, reluctant girl is faced with the decision of her life. Stay home and chillax or get off her butt and save the world. When the chillaxing thing goes wrong, she's forced to save the world instead.

**Question 2:**
A. Battles between good and evil.
B. A story to explain nature and cosmic events.
C. An initiation process.
D. None of the above.

**Example Question 1:**
Joseph Campbell suggests that the “Hero’s Journey” represents the following in most cultures.

1. **Example Question 1:**
   A. A story to explain nature and cosmic events.
   B. An initiation process.
   C. None of the above.

2. **Example Question 2:**
   A. Parker is young and fearless and with the help of her intergalactic friends, she is destined to save the universe.
   B. A stressed-out pre-teen, whose main skills are avoiding school and binge-watching TV, suddenly realizes that she, along with her cosmic alter egos, must stop an evil supervillain intent on stealing all that is good from the universe.
   C. A super-villainy, interdimensional entity decides to wreak havoc on the universe by sucking up all the positive energy, leaving the rest of the universe to slowly rot.
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**Question 2:**
A. Battles between good and evil.
D. Procedure

Participants were initially provided with consent materials and a unique participant code which was used to link the pre and post seminar questionnaires and results. Participants were also asked to complete a short STAI and PANAS survey, then explanation of the process)

Proper disinfection rules were followed (both priming conditions vs. No Prime condition.

Results for all conditions were strong (>5). After reviewing the outlier data, we opted to confirming significance & artifacts

Mean Variances df t Stat P(T<=t) one-tail P(T<=t) two-tail

<table>
<thead>
<tr>
<th>Variable</th>
<th>Prime</th>
<th>No Prime</th>
<th>Animation</th>
<th>No Prime</th>
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<td>9.6875</td>
<td>11.44</td>
<td>9.6875</td>
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<tr>
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<tr>
<td>t Stat</td>
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<tr>
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<td>0.0104</td>
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<tr>
<td>t Critical one-tail</td>
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<tr>
<td>P(T&lt;=t) two-tail</td>
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<td>0.0206</td>
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<tr>
<td>t Critical two-tail</td>
<td>2.0422</td>
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<td>2.0423</td>
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TABLE I. AFFECTIVE RESULTS FOR ANXIETY AND POSITIVE AFFECT

<table>
<thead>
<tr>
<th></th>
<th>Pre Course</th>
<th>Post Course</th>
<th>Anxiety Reduction</th>
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<tr>
<td><strong>Prime Artifacts</strong></td>
<td>9.8</td>
<td>8.2</td>
<td>1.6</td>
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<tr>
<td><strong>Prime Animation Studio</strong></td>
<td>10.5</td>
<td>9.4</td>
<td>1.1</td>
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<tr>
<td><strong>No Prime</strong></td>
<td>9.9</td>
<td>8.1</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>10.1</td>
<td>8.2</td>
<td>1.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pre Course</th>
<th>Post Course</th>
<th>Positive Affect Increase</th>
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<td>29.1</td>
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<tr>
<td><strong>Prime Animation Studio</strong></td>
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<td>27.7</td>
<td>1.5</td>
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<td><strong>No Prime</strong></td>
<td>27.9</td>
<td>29.9</td>
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<td><strong>Average</strong></td>
<td>27.6</td>
<td>28.9</td>
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</table>

<table>
<thead>
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<th></th>
<th>Pre Course</th>
<th>Post Course</th>
<th>Negative Affect Reduced</th>
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<tbody>
<tr>
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<td>11.1</td>
<td>2.2</td>
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<tr>
<td><strong>Prime Animation Studio</strong></td>
<td>13.2</td>
<td>10.9</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>No Prime</strong></td>
<td>12.3</td>
<td>11.7</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>12.3</td>
<td>11.2</td>
<td>1.0</td>
</tr>
</tbody>
</table>

1) **UX Commentary Feedback**

There were dozens of unique comments that validated designs and/or recommended improvements to the VR experience. A sample of the more salient comments are presented below.

We do not differentiate comments between Prime and the No Prime conditions as all VR conditions elicited both positive and negative feedback, which was consistent with the affective data.

2) **Example Positive Comments**

- Felt real and engaging
- When in VR classroom, you feel totally immersed
- Far better than wearing a mask for 2 hours trying to hear what your prof is saying.
- It reminds me of the university setting but with the elimination of the anxiety.
- When focused on the lecture I enjoyed the information and was surprised at how much it felt like a real classroom.

3) **Example Negative or Mixed Comments**

- Not quite real enough though better than zoom
- Sometimes images would distort which reminded me that I was in a virtual space rather than a real one.
- Issues of image resolution and inability to take notes.
- I found myself very tired and not able to focus
- During my experience, I'd repeatedly remind myself that as real as it seems it's merely a virtual world.

V. **DISCUSSION**

In reviewing the first hypothesis (H1), both Prime conditions observed significant improvement over the No Prime condition, while there was no significant difference between two priming contexts. Hence, H1a and H1b are both supported. The priming conditions improved academic performance.

In reviewing the second hypothesis (H2), neither Prime condition demonstrated significance over the No Prime condition. Hence, H2a was not supported. The Prime conditions did not observe significance between themselves with respect to UX results. Hence, H2b is supported.

In summary, Prime conditions did not improve the perceived UX compared to the No Prime condition or between Prime conditions.

There was a great deal of relevant feedback provided through the UX study that will inform future design. In general, it was a very positive experience where most participants felt a strong sense of presence and were sufficiently engaged in the content. That said, image resolution and blurriness appeared to be a distraction for some and as such, most likely reduced immersion, and presence effects. Striving to eliminate issues of blurriness, aliasing, or any image resolution issues should be a major focus in future environment and character designs for VR spaces.
Determining the effect of situational priming on anxiety and positive outcomes

By Duguid, M.

In our study of 51 participants, we wanted to understand the priming potential of VR environments used while content is observed, and the tests are administered. Dopamine release and other neurotransmitter levels vary depending on brain activity and affective surveys (an affective solution). The research team was able to complete the test using virtual reality (VR) technology.

Motivated by the disruptive potential of immersive VR, we observed a clear distortion induced by virtual reality. Prime Motivated by the disruptive potential of immersive VR, we observed a clear distortion induced by virtual reality. Prime

While the UX and affective measurements were done remotely, in person feedback from researchers would have been much more reliable. Affective surveys (an affective solution for university researchers in 2021 and the year of the seminar for this study) were significant.

Finally, as accessibility is critical and not everyone can use VR, it was suited well for both the ELT cycle and an SLT learning environment based on collaborative, community-orientated activities. Also, the seminar for this study was a creative process that was conducive to collaborative, community-orientated activities.

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Minor issues are easily alleviated with “in person” support or multi-activity setup.

The combined effect of deploying multiple priming methods, varying priming strategies, and was suited well for both the ELT cycle and an SLT learning environment based on collaborative, community-orientated activities. Also, the seminar for this study was a creative process that was conducive to collaborative, community-orientated activities.

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Acknowledgment

Special thanks to Edin Ibric, Jonathan Jackson, and Paul Duguid. Situated cognition and the culture of learning.

References


Determinants of the bias.

Yourself in the skin of a black avatar reduces implicit racial affects product choice.


