

Article

Exploring the Perception of Additional Information Content in 360° 3D VR Video for Teaching and Learning

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Interview prompts (sorted by subject area)

Factual/Knowledge prompts

K1: Was this your first time using a VR headset?
(follow-up) if so, what have you used previously?
Behaviors
B1: Did you look around much during the video?
(follow-up) why did you look around?

Sensory information

S1: (Video B or C) If text was present in the video, how easy did you find it to read?
OR
(Video A) How easy did you find it to identify key feature?
(follow-up) do you think the video could have benefitted from labelling and/or text?

Opinions and values

O1: What do you think could have been added to improve the video?
(follow-up) Can you think of anything which could be added which would help you improve your understanding of the information?
O2: What did you think of the video length?
(follow-up) would you prefer if it were longer, shorter or the same but cut into smaller clips?
O3: I want you to imagine having the same tour in person. Can you think of any differences or similarities with the VR approach?
(follow-up) do you have a feel for the layout of the Pharmacy from the video?
O4: Are there any other aspects of the use of VR within teaching that you would like to comment on?

Feelings

F1: How confident did you feel when using the headset (scale 1 – 10)?
(follow-up prompt) can you tell me more? (explore definition of confidence)
F2: How comfortable did you find using the headset (scale 1 – 10)?
(follow-up prompt) can you tell me more? (explore definition of confidence)
F3: Did you enjoy using the headset (scale 1 – 10)?
(follow-up prompt) can you tell me more (explore definition of enjoyment)
F4: Did you feel that you were able to take in all of the information being presented?

(follow-up) Can you think of anything which could be added which would help you improve your understanding of the information?

Interview Schedule

K1: Was this your first time using a VR headset?

(follow-up) if so, what have you used previously?

F1: How confident did you feel when using the headset (scale 1 – 10 can be suggested)?

(follow-up prompt) can you tell me more? (explore definition of confidence)

F2: How comfortable did you find using the headset (scale 1 – 10 can be suggested)?

(follow-up prompt) can you tell me more? (explore definition of confidence)

F3: Did you enjoy using the headset (scale 1 – 10 can be suggested)?

(follow-up prompt) can you tell me more (explore definition of enjoyment)

O2: What did you think of the video length?

(follow-up) would you prefer if it were longer, shorter or the same but cut into smaller clips?

B1: Did you look around much during the video?

(follow-up) why did you look around?

S1: (Video B or C) If text was present in the video, how easy did you find it to read?

OR

(Video A) How easy did you find it to identify key feature?

(follow-up) do you think the video could have benefitted from labelling and/or text?

O1: What do you think could have been added to improve the video?

(follow-up) Can you think of anything which could be added which would help you improve your understanding of the information?

F4: Did you feel that you were able to take in all of the information being presented?

(follow-up) Can you think of anything which could be added which would help you improve your understanding of the information?

O3: I want you to imagine having the same tour in person. Can you think of any differences or similarities with the VR approach?

(follow-up) do you have a feel for the layout of the Pharmacy from the video?

O4: Are there any other aspects of the use of VR within teaching that you would like to comment on?

Video A

Video B

Video C

Back of dispensary

(1m 13s)



Main dispensary

(4m 15s)



Storage area

(19m 17s)



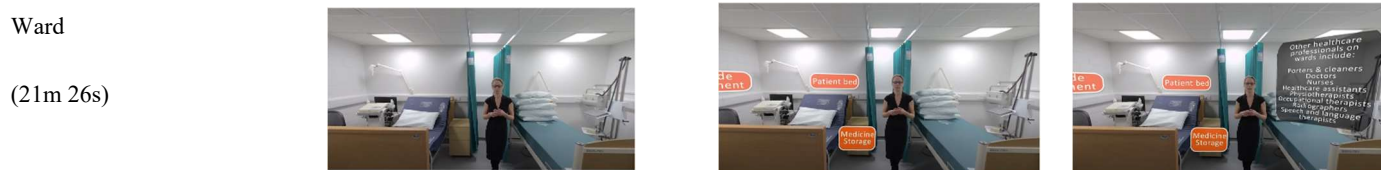


Figure S1: Screen captures showing the user perspective (if looking straight ahead) during videos A, B and C at four different time points in different locations during the video experience

Table S1: The themes and sub-themes identified in this study

Theme	Sub themes	Example quotes
Interaction with the virtual "real" environment <i>Perceptions around the experience and learning related to the simulated environment with no additional augmentation i.e. the virtual representation of the environment as it would be in the real world</i>	Exploration of content in the virtual real environment	<i>Usually when you're here in person, you expect it to be like looking at the person talking and to show you are actually listening too but I didn't feel that need there and I just listened to what happened and I was looking at all the things around me</i>
	<i>Factors affecting the extent to which learners explore the virtual real environment within the experience</i>	<i>Curiosity, to see what everything was there just to get all of it in. It's not usual where you get to see a film, you just get to have a look around and see the rest of the scenery as well but yeah its interesting being able to see everything in the room as opposed to what's right in front of you. I don't know how you would address it but I was so distracted by the fact I could look around and explore that I didn't necessarily take in the information. I was aware she was talking and I was trying to pay attention but then I was like, oh, what's that over there</i>
	Learning in the virtual real environment <i>Perceptions around learning in the virtual real environment</i>	<i>So I think it does definitely have sort of those advantages to VR so you can see more almost you can go back and review it, you can take your time with it</i> <i>But then the issue with going in person is that you don't get to do it again if you forget something</i>

		<p><i>I think it was better because if you are in a big group you aren't standing behind someone, you aren't trying to listen to someone and it's focussed on you, that's a positive for the VR headset for sure</i></p> <p><i>I think one downside of the VR headset is I couldn't take notes, so I wouldn't have been able to recall that information through that</i></p> <p><i>if there was maybe a short quiz after each clip or like if you had maybe split it into two or something then that might work as well</i></p> <p><i>It would have also helped to see the steps of doing things in the rooms, like dispensing or something, it would be easier for me to remember, step by step or process by process, you know</i></p> <p><i>I think if it was in person, you would have a much better understanding of the actual layout of the pharmacy would be my sort of main takeaway from it, basically because you were jumping between different rooms its more difficult to tell where you are</i></p>
<p>Interaction with the virtual "augmented" environment</p> <p><i>Perceptions around the experience of learning and content within a simulated real environment which has then been augmented with elements not found within the real environment, in this case text, labels and sounds</i></p>	<p>Labelling</p> <p><i>Perceptions of usefulness and optimal placement of labels within the virtual augmented environment</i></p>	<p><i>The orange ones were easier, I think they were shorter as well</i></p> <p><i>For example, they put everything into the different trays. It might have been good to actually have the trays there with the different labels on them</i></p> <p><i>it's nice to know what is what, it's information on top of what is said, its healthy for people with different memories but some people remember things if it's said, others are visual, so I guess it's better for those people</i></p>

	<p>Summary text</p> <p><i>no issues reading it at all. It was a higher quality than most of the other parts of the video as well</i></p> <p><i>Perceptions of usefulness and optimal placement of summary text within the virtual augmented environment</i></p> <p><i>sometimes I got distracted from what she was talking about and focusing on reading I liked the pop-ups which summarised what she was saying, I thought they were really good and because they covered sort of the really important parts of what she was saying.</i></p>
	<p>Learning in the virtual augmented environment</p> <p><i>I was really like “yeah I know this one” because it was labelled</i></p> <p><i>Perceptions around learning in the virtual augmented environment</i></p> <p><i>I did find them really useful, I got a bit distracted but they did help to solidify points more.</i></p>
	<p>Exploration of content in the virtual augmented environment</p> <p><i>There were the orange text markers so I was looking around to see if there were any of those in the clip anywhere other than straight forward</i></p> <p><i>Factors affecting the extent to which learners explore the virtual augmented environment within the experience</i></p> <p><i>there was a pop up message with a noise and that has now stuck that this was a good signpost that made me think this is where I should be looking next so having that dynamic element made me focus at the right time when she was talking about things.</i></p>
	<p>Adding augmentation features</p> <p><i>I think it would have been very useful to have little labels pop up as things were being explained to explain which segments she was referring to</i></p>

	<p>Requests to add features which would not have been possible in a real life environment</p>	<p><i>If you could see labels above different doors to other places that would potentially help there. So I think labels and the text would certainly be useful, absolutely.</i></p> <p><i>Smaller rooms it's not that hard to figure out where she is pointing but then the largest rooms that might actually yeah be helpful.</i></p> <p><i>You're kind of teleported there so perhaps a video of just someone walking through those spaces at the beginning, or an embedded video or even a floor plan might be something that can help you picture where you are</i></p> <p><i>So asking about whose role was what, I struggled a bit more with and again perhaps that's because I have less familiarity with the area but perhaps not if this is intended for students who are coming in kind of a baseline as well, then I think understanding which role applied to which room and which scenario. Maybe that could have been, you know, better sign-posted visually maybe with text.</i></p>
<p>Usability</p> <p><i>Physical factors which affect the learning experience related to the physical learning environment and delivery method</i></p>	<p>Comfort and discomfort</p> <p><i>Factors influencing learner comfort and discomfort during the experience</i></p>	<p><i>So that specific headset was very comfortable inside</i></p> <p><i>it's obviously quite bulky and a little bit heavy</i></p> <p><i>I think worst part was the quality of the video. My eyes get really tired after a while if I have head bobbing on in a video game, this will cause me motion sickness. I found a similar experience if I moved my head too quickly. If I sat still it wasn't too bad but if I move my head too quickly to the right or left I would get a bit motion sickness or disorientation</i></p> <p><i>it's a bit uncomfortable with glasses on</i></p>

	<p>Factors affecting enjoyment</p> <p><i>Physical elements which positively or negatively affect the enjoyment of the experience by the learner</i></p> <p><i>I quite liked the novelty of it at least and I quite liked the different format and I found it quite fascinating actually being able to look at it from a 360 degree point of view</i></p> <p><i>I had fun and it was something new to try It was immersive, I was interested in finding out what was happening in the video but some of the discomfort elements were negative the video quality wasn't perfect, it was pixelated, so it didn't feel like I was completely in but it was still enough that I was able to see what the room was like</i></p>
	<p>Experience of headset use</p> <p><i>Perceptions of the overall experience of using the headset, such as ease of use</i></p> <p><i>I found that it was very intuitive with the controller, like to point and click</i></p> <p><i>Initially it was a bit difficult but within a few minutes.. I understand how to use it easily now</i></p> <p><i>You know, just hold the button down to sort of bring up the menu and then from there it's just like using, I don't know, say another games console or controller of some kind</i></p> <p><i>it took time to get it like it actually fitted</i></p>
	<p>Video length</p> <p><i>Perceived parity or disparity between the actual video length and that viewed as ideal by learners</i></p> <p><i>I thought it was too long, I wasn't able to focus for the length of the video.</i></p> <p><i>It could work well if there were a break in the middle to just give yourself a bit of a break and acknowledge that you feel that discomfort and that its ok to pause the video and have that break</i></p>

	<p><i>I think it was a little bit too long, but that might have just been again because I was a bit uncomfortable towards the end, maybe a bit of motion sickness and by the end I wanted to take the headset off.</i></p>
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