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CONDENSED PAPER SHOWING THE LAYOUT**

The Use of Virtual Reality in Education

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Abstract

Recent research in the area of multimedia conducted by the author in Australia, the United States and Latin America has re-confirmed the importance and effectiveness of visual features in teaching and learning materials. It has been demonstrated that multimedia can provide a very effective teaching and learning environment in such a way that the learning style preferences (visual, aural, text and kinaesthetic) of the learners are taken into consideration.

Based on these findings, further research was carried out to investigate the possibilities of creating even richer visual learning environments. The objective was to explore the learning effectiveness of virtual reality educational multimedia systems.

Key words: virtual reality, immersive, multimedia, nursing, education

Introduction

Although the term Virtual Reality (VR) is used for different purposes, the original concept refers to *immersive virtual reality*. The general concept of immersive virtual reality was developed back in the late 80s. In immersive virtual reality, participants interact with a world completely generated by computer which is a virtual replica of the actual subject.

- Medical students can operate on virtual patients and practise various surgical procedures in an interactive manner;
- An architect can take his/her clients on a virtual tour of the dream home designed, see Easypano (n.d.); or
- Different people at different locations can become part of a team, interact with common objects and environments.

(a) Calculation of Weighted Average Index (WAI)

The frequencies of responses of students were recoded in SPSS program by giving the highest weight of one ($5/5 = 1$) to the ‘strongly agree’ and 0.8 ($4/5 = 0.8$) weight to the ‘agree’ and so on. And then, the Weighted Average Index (WAI) was calculated as follows:

$$WAI = \frac{f_5 \times 1 + f_4 \times 0.8 + f_3 \times 0.6 + f_2 \times 0.4 + f_1 \times 0.2}{F_{total}}$$

Where, WAI = Weighted Average Index,

f_1 to f_5 = Frequencies of the ‘Factor’ (one to five)

F_{total} = Total Frequency

(b) Test of Significance

The combined and separate WAI values of two groups of students were analyzed. And then, Independent Student’s t-test was applied to determine whether or not the perception of two groups of students on different ‘Factor’s is significantly different.

Statistical analysis has revealed that an overwhelming number of students do strongly agree with the following factors. See Figure 4 and Table 1 for details:

1. I enjoyed my VR learning experience.
2. My learning experience speed was very fast.
3. My learning experience was very easy.
4. The learning materials were related strongly to the real world.
5. The VR method helped me greatly with my understanding of the concepts.
6. I would very much like to have VR multimedia incorporated into my learning materials.

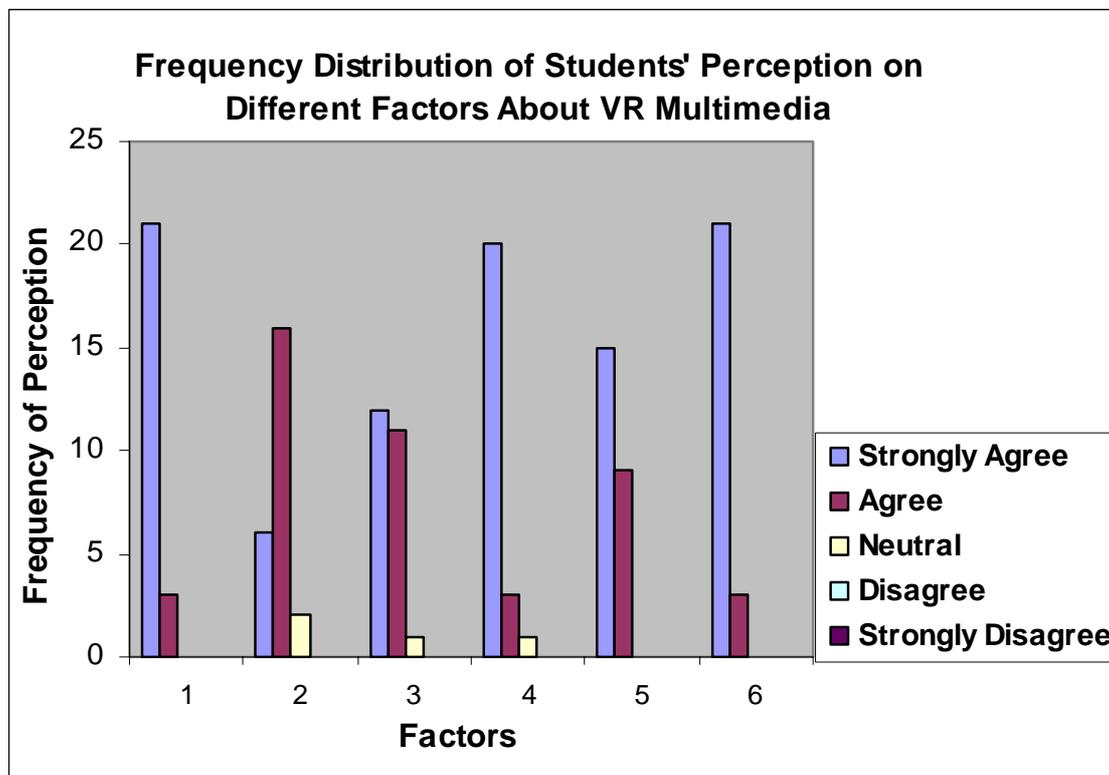


Figure 4 - Frequency Distribution of Factors (1 to 6) as Provided by Students

Table 1 - Frequency Distribution of Factors (1 to 6) as Provided by Students

| Perception | Enjoyment | Speediness | Easiness | Real World View | Concept Building | Inclusion in Learning Materials |
|-------------------|-----------|------------|-----------|-----------------|------------------|---------------------------------|
| Strongly agree | 21 (87.5) | 6 (25) | 12 (50) | 20 (83.3) | 15 (62.5) | 21 (87.5) |
| Agree | 3 (12.5) | 16 (66.7) | 11 (45.8) | 3 (12.5) | 9 (37.5) | 3 (12.5) |
| Neutral | 0 | 2 (8.3) | 1 (4.2) | 1 (4.2) | 0 | 0 |
| Disagree | 0 | 0 | 0 | 0 | 0 | 0 |
| Strongly disagree | 0 | 0 | 0 | 0 | 0 | 0 |
| No. of students | 24 (100) | 24 (100) | 24 (100) | 24 (100) | 24 (100) | 24 (100) |

Note: Figures in parentheses are in percentage

Conclusions

It was reported that visually rich multimedia can provide a very effective teaching and learning environment (Nooriafshar and Todhunter, 2004). A virtual reality multimedia can even further enhance learning by incorporating more realistic images and visual features. This would lead to a situation where the learners could immerse themselves in the environment and interact with objects and scenarios in a dynamic manner. Very high Weighted Average Indices, t-tests and interview comments in this study support that:

- the virtual reality multimedia is a highly preferred way of teaching and learning;
- there is not a significant difference between the two groups' preferences; and
- the benefit is transferable between different fields.

Future projects will include exploring ways of designing educational virtual reality multimedia for other topics. For instance, *Factory Layout* in a typical Production and Operations Management course would be ideal application in terms of user interaction.

Formatting of references (not shown throughout this paper)

References

Book example:

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