

Impact of pairing an augmented reality demonstration with online video lectures... Does it improve students' performance?

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Introduction

- Massive Open Online Courses have become sensational in the field of distance learning. There is a plethora of advantages being listed in learning through MOOCs but this pedagogy lacks in few areas when compared with traditional classes.
- . There are many studies currently being targeted towards the area where the MOOC technology lacks and one of those areas is – *'MOOCs are not for laboratory/practical based courses'*
- This study replaced a MOOC video module with augmented reality (AR) and hopes that it would prepare a class of multimedia and animation students in the Vellore Institute of Technology before their practical session on Photography.

Purpose of the Study

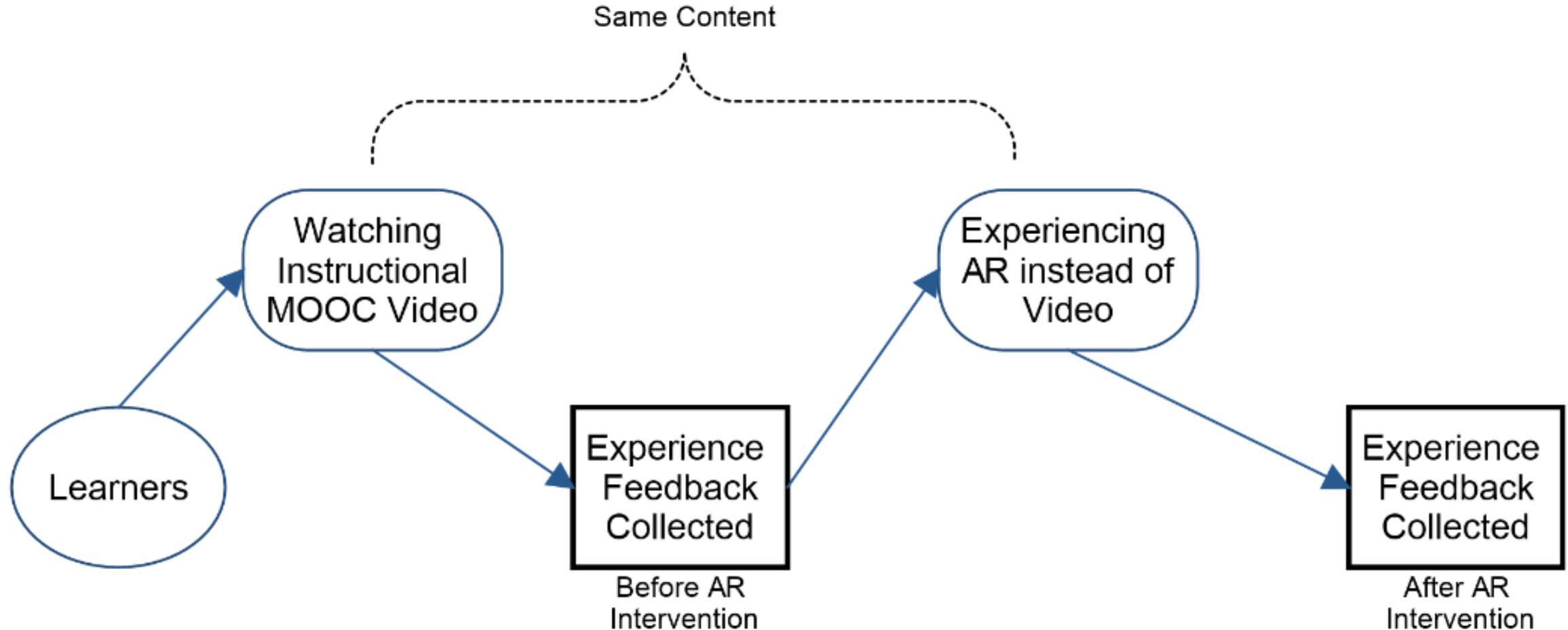
- The authors of this study want to know how good a MOOC course prepares the students for a practical/lab session. The authors also want to understand the level of confidence the learners possess to carry out their practice session before and after augmenting a MOOC module.
- As indicated by a few studies, the confidence of MOOC learners depends upon their *motivation, concentration and enthusiasm*.

Sample Data

- The sample of this study is the 2nd year students pursuing their bachelor's in Multimedia and Animation at Vellore Institute of Technology (VIT), India. The class consists of 33 students (N=33) and one of their practice sessions is Digital Photography.
- During their first session for the aforesaid subject, students are usually asked to go through a MOOC course on 'Handling a Camera' which is available in the institution's online course database.
- The detailed video lecture shows the different parts of a camera and prepares them to handle a real digital camera in their hands-on session.
- The sample consists of both genders and all of them are between the age of 18 – 25. The class was chosen on purpose as they were suitable for the present study.

Study Design

The responses had been collected right after the online video experience and again the same questionnaire had been presented to the respondents after their AR experience (same group pre-test – post-test model). The sample for both responses is the same. The respondents were kept unaware of the upcoming AR experience to avoid biased responses.



Research Assumptions

Null Hypothesis (H0 = H1)

- There will be no significant change in the amount of learners' concentration and confidence rating after AR intervention. (H0)

Alternate Hypothesis (H0 ≠ H1)

- There will be a significant change in the amount of learners' concentration and confidence rating after AR intervention. (H1)

AR Experience



- For the AR experience, the authors studied the real camera and made a 3D model of it using Autodesk Maya. Then they took the model into Unity Game Engine and with the help of Vuforia software within it, they made an AR app that renders the camera model on a marker (some unique picture that triggers the AR render).
- The respondents can view the camera model up close and from all angles and the 3D model was designed to look as close to the real camera.

AR Experience (contd.)

- The class has been asked to see the MOOC video on their mobile phones first. The respondents did not have any restrictions on the number of times the video can be seen. Once all the respondents were done watching the course, they filled the questionnaire.
- Then, the whole class had been informed about the AR experience and the AR app designed especially for this study was installed on the respondents' smartphone. After the installation, the respondents used the markers given to them and experienced the same information from that online video but in the form of Augment Reality.

Discussions

As per the results computed by SPSS, the authors would like to interpret the results statistically. For this study, it's assumed that if the p-value result is less than 0.05, then the statistical test is significant.

Descriptive Statistics					
	N	Mean	Std. Deviation	Minimum	Maximum
Before AR - Concentration Level	33	4.0000	.96825	1.00	5.00
Before AR - Confidence Level	33	3.7273	1.03901	1.00	5.00
After AR - Concentration Level	33	4.3636	.92932	1.00	5.00
After AR - Confidence Level	33	4.2424	.66287	3.00	5.00

Learners' level of concentration scores was compared before and after AR intervention. As per Table, on average, learners' concentration level ratings were lower before (Mean= 4.0) than after the AR presentation (Mean= 4.36). A Wilcoxon signed-rank test revealed that this difference was statistically significant, $T=107.50$, $z= -2.180$ $p<0.05$

Learners' level of confidence scores was compared before and after AR intervention. As per Table, on average, learners' confidence level ratings were lower before (Mean= 3.72) than after the AR presentation (Mean= 4.24). A Wilcoxon signed-rank test revealed that this difference was statistically significant, $T=167$, $z= -2.465$ $p<0.05$

Since the p-value of both the variables (Learners' concentration and Learners' Confidence) was lesser than the cut-off value of this study which is 0.05, the authors have rejected the null hypothesis and accept the alternate hypothesis.

Conclusions

- As per the statistical analysis and the results obtained, the authors conclude that there is a statistically significant difference in the ratings before and after the AR presentation.
- The direction of the change can be understood from Table, the mean values of both the variables are higher after the AR treatment. So, it is safe to say that learners' do feel more confident and ready for their practical session when they are allowed to go through an AR simulation than a traditional, flat 2D video.
- The authors also believe that the engaging nature of AR increases learners' concentration, as well. MOOCs have been constantly receiving critics for not supporting laboratory-based courses and using Augmented Reality as an alternative way of presentation might help in preparing the learners better for their hands-on sessions.

Future Work

- AR is still in its early stages and many studies are being concentrated on making MOOCs more friendly for practice-based subjects. The AR module is also not very expensive to implement and apart from its benefits being discussed in this study, it might also improve other factors such as level of interaction, motivation and so on.
- The continuation of this study can be the observation of the students during their lab sessions. They can be monitored if the AR treatment shows any difference in their risk-free operation and the fluency in handling the equipment.

Thank you

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