Proof of Concept: Effectiveness of Photography Training Simulator during COVID-19

M. Izani Zainal Abidin
Higher Colleges of Technology, UAE, https://orcid.org/0000-0002-8254-1219

E. Alkaabi
Higher Colleges of Technology, UAE

A. Razak
Multimedia University, Malaysia, https://orcid.org/0000-0002-3359-2140

Abstract: With an urgent change of the learning approach from face-to-face to online learning in academic institutions due to the COVID 19, this medium's effectiveness is arguable, particularly in the case of practical-based courses. This paper discusses our experience in handling photography course during this pandemic time using an online simulator and proposes an interactive VR-based camera simulator to learn photography course using online platform. Photography has been selected as the main course based on the actual learning experience at the Applied Media Department, Higher Colleges of Technology (HCT), Men's Campus Abu Dhabi, UAE. We explore 10 online digital camera simulators and present an analysis of these applications' features, usability, and interactivity. Then, one chosen simulator is implemented to teach a 15 weeks photography course through a digital platform, and the feedbacks from students were collected and discussed. It is found that using a DSLR simulator allows students to explore and understand the concept of using a camera and photography. This paper presents the proof of concept for a DSLR simulator based on immersive environment and virtual reality, which is enhanced with interactive features that mimic the actual DSLR camera. Our proposal includes suggestions of missing features for the current simulators to overcome the course's physical and practical issues.

Keywords: DSLR, Photography, Online learning, Simulation, Interactive application

Introduction

The current online learning phenomenon which become mainstream in 2020 was a result of an emergency decision making due to the COVID 19 pandemic (Aguilera-Hermida, 2020; Hussein et al., 2020). Without adequate preparation and guidelines, the academic institutions have no choice but to adopt to fully digital and online learning approach. Photography is one of the main courses taught at the Applied Media Department,

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Higher Colleges of Technology, UAE. This course develops conceptual and technical skills needed to function as a professional photographer in a variety of media and platforms. It also explores both analog and digital technology as students work in an experimental and critical environment to appreciate both historical developments and contemporary practice in commercial photography. At the end of the course, students will create a mini digital portfolio by implementing all the knowledge and skills gained throughout the course. Previously, the course was handled using face to face approach through physical classes at the university with the course materials accessible through Blackboard. However, due to the COVID 19 pandemic and the declaration of the state of emergency (Allam, 2020) and lockdown in the UAE beginning March 16, 2020, face to face approach is no longer allowed. Having to handle a practical based course in full digital mode is very challenging and sometimes frustrating (Abou-Khalil et al., 2021; Owusu-Fordjour et al., 2020). However, it is acknowledged that the advancement of technology in digital applications and devices development has helped us in handling online courses (Koi-Akrofi et al., 2020; Niemi & Kousa, (2020; Onat Kocabiyik, 2021). Hence the objective of this paper is summarized as the followings:

- To compare 10 online camera simulators and study their features including weaknesses and advantages.
- To select one online simulator to be implemented in a 15 weeks photography course and get feedbacks from the student.
- To present the proof of concept for the proposed VR based camera simulator for learning photography on online platform.

Methodology

Research Question: What are the factors that make effective online camera simulator?

To answer this question, we have chosen to analyse ten online simulators and explore the application's features and usability from 8 categories: choices, shooting features, type, interactivity, feedback, exposure meter, learning lesson, and shooting mode. The advantages and disadvantages of each category's features are discussed and analysed to identify the main features that will be added to the proposed VR-based camera simulator application.

Then we chose to experiment with one online simulator called Canon PLAY developed by Canon to teach our photography course in fully digital mode. This application aims to assist the beginner in photography to get some idea and concept using the virtual camera. The simulation allows students to understand and practice handling DLSR camera with similar features that mimic the actual DSLR. A survey will be conducted at the end of the course to get feedback from the students on the effectiveness of this approach in general and the usability of the Canon PLAY application. Finally, based on all the collected information, we present the proof of concept for a VR-based camera simulator to help teach photography courses, especially during this pandemic, where face-to-face approach is not available.

Analysis

Ten interactive online camera simulators have been identified for this analysis namely Canon PLAY, Exposure Simulator, Photography Mapped CameraSim Dofsimulator Be the camera Nikkor Lens Simulator Camera Simulator by Canon Labs Samyang Lens Simulator Magic Hour.

Table 1. Summary of the analysis of 10 online camera simulators

Simulator name	Choice		Shooting Features	Type	Interactivity	Feedback	Exposure meter	Learning lesson	Shooting mode
	Lens	Scene							
PLAY Canon	No	1	ISO, Aperture & Speed	Web based	Shutter release	Yes	Yes	Yes	Manual, Aperture Priority & Speed Priority
Exposure Simulator	No	1	ISO, Aperture & Speed	Web based	Image slider	No	No	No	Manual, Aperture Priority & Speed Priority
Photography Mapped	No	1	ISO, Aperture & Speed	Web based	Shutter release	Yes	Yes	No	Manual & Auto
CameraSim	No	1	ISO, Aperture & Speed	Web based	Shutter release	Yes	Yes	No	Manual, Program, Aperture Priority & Speed Priority
Dofsimulator	Yes	8	ISO, Aperture & Speed	Web based	Image slider	No	No	No	Manual
Be the camera	Yes	6	ISO, Aperture & Speed	Web based	Image slider	No	No	No	Manual, Auto, Aperture Priority & Speed Priority
Nikkor Lens Simulator	Yes	1	No	Web based	Image slider	No	No	No	No
Camera Simulator by Canon Labs	Yes	Multi	ISO, Aperture & Speed	VR	Shutter release	No	Yes	No	Manual, Auto, Aperture Priority & Speed Priority
Samyang Lens Simulator	Yes	3	Aperture	Web based	Image slider	No	No	No	Aperture
Magic Hour	No	Multi	ISO, Aperture & Speed	VR	Shutter release	No	No	No	Auto, Aperture Priority & Speed Priority

The categories included in the analysis are choices for lens and scene, shooting features, platform type, interactivity, feedback, exposure meter, learning lesson and shooting mode. Table 1 below summarizes the output of each category for each simulator.

From the table, it shows that five of the applications do not have choices for choosing lens. This gives a very limited features for users to explore with various lens. Others have more choices of lens which give more options to choose and explore various features like zoom and wide angle. Out of ten applications, it is found that five of them only have one scene for shooting, three applications have more than one scene and two has multi scene choices because it is based on virtual environment which allows users to change the unlimited angle. For the shooting features, eight out of ten applications have complete features like ISO, speed and aperture, one has no features at all and another one has only aperture feature. Eight applications are web-based application and two are VR based applications. For the interactivity, five applications use shutter release option and another five uses image slider option.

Only three applications provide feedback after the users use the application and seven have no feedback features which gives no comments or suggestion to the users. For exposure meter, four applications provide that features and six has no exposure meter features. Exposure meter is very important for the users to choose the right combination of the photography elements like speed and aperture. Only one application provides learning lesson features which allows users to learn basic knowledge about photography while exploring the applications. One application has no shooting mode feature, one has manual mode, one has aperture mode and seven has all the basic shooting modes like manual, aperture priority, speed priority, automatic and program.

From this analysis, we prioritize five important aspects to improve and to apply in our proof of concept application. This application is based on VR features and technology. These are outlined as below:

Lens options: To add more interactive features and more options for the users to choose various lens, we plan to provide three lenses for our application like wide angle, standard and telephoto lens.
Scene: Our first development of the scene will be only one scene in immersive environment with realistic lighting and environment. Our scene has some movement like flying birds and running horses. This allow users to shoot using various modes and explore more possibilities.
Shooting features: It will show three options like aperture, ISO and shutter speed. It will utilize shutter release for taking photos. In addition, exposure meter will provide assistance to the users like the actual digital camera for measuring correct exposure.
Feedback: The proposed application has feedback features which will appear after shooting each photo and has option to turn off if necessary. Additionally, learning lessons also will be provided for new learners to understand the concept of photography.
Shooting mode: The application will have five modes like automatic, manual, shutter priority, aperture priority and program. This will mimic the actual digital camera features.

Photography Course Experiment using Canon PLAY

The course structure

This course timeline is 15 weeks and divided into two sections; theoretical and practical sections with 3 credit hours. The first four weeks activities covered the theoretical background, lectures and conceptual explanation about photography. The course is continued with the practical implementation using Canon's DSLR camera simulator online from the fifth week onwards. At this stage, the students will explore and experiment with the theory and concept learnt in the previous classes.

The Canon PLAY application

The Canon PLAY application imitates all the standard DSLR camera core features, including aperture, shutter speed, and ISO. It also consists of standard three shooting modes like manual, shutter priority (Tv) and Aperture priority (Av). However, there are some missing features for future improvement, which we will discuss in the next section. These are basic features for beginners who need to understand the whole concept of taking photos. This application offers three main categories of features which are:

Learn

This section covers four basic photography topics like aperture control, shutter speed, ISO and exposure meter. These four features are basic elements that students need to understand and know how to control. Besides, this section also provides tips and notes for further understanding.

Play

The play section consists of the main interactive features of this application. It comes with an interface (Figure 1) and simulator that controls the whole concept of taking a photo that replicates DSLR camera. Once the photo is taken, it will immediately appear at the bottom of the screen and feedback will automatically generated based on the quality of the photo taken.

There are three elements of the play interface as below:

- *Main interface acts as a viewfinder*
- *Result interface to show the output and feedback based on the photo taken*
- *Examples and guidelines based* on good photos attached to the correct setting

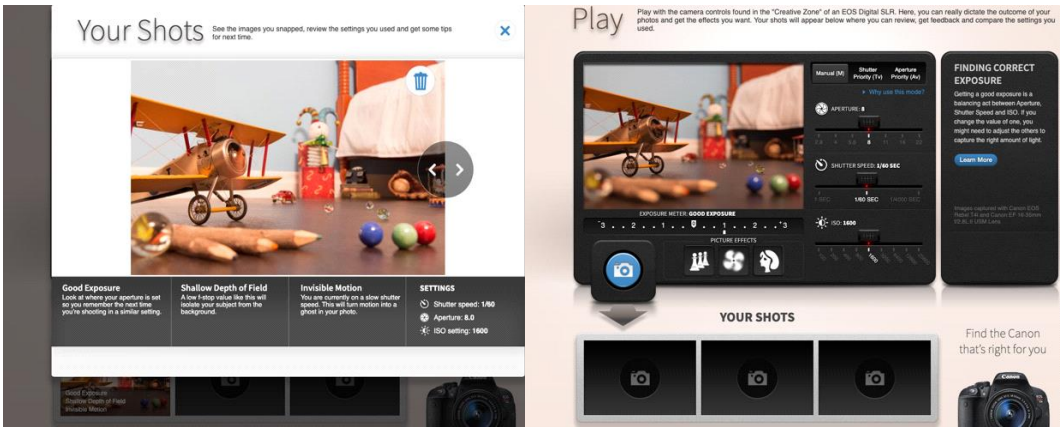

Figure 1. The main interface for the PLAY application

Challenge

Challenge section allows user to explore more interactive features like challenging themselves by trying to take photo based on the given example. The instruction will be generated together with the sample picture.

The survey

A total of 46 students have participated in a survey consisting of 29 female and 17 male students. The research asked students some questions such as their learning experience using online platforms in general and questions specific to using the Canon PLAY simulator. They were asked to give a rating of 1 to 5 with (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree on each of the survey questions and an open-ended question regarding their overall comment on the experience.

Overall, 81.2% of the respondents either agree or strongly agree that they are comfortable learning this course through an online platform without face to face interaction. However, if given a choice, 72.3 % of the respondent would prefer face to face learning for this course. Among the reasons given for this are they like to have direct communication with the instructor because it is easy to ask questions directly. They found it challenging to learn practical course through an online platform. Figure 2 shows the response to the question of whether the respondents believe that the online learning approach that we used for this course is effective for them. With 72.3% either agree or strongly agree on this point, it might suggest that the online simulator Canon PLAY have contributed to this response.

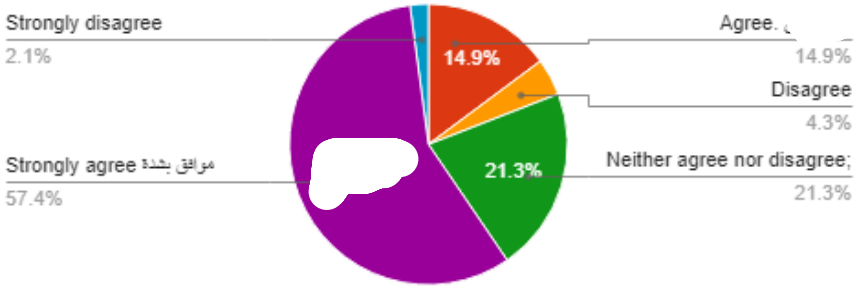

Figure 2. Response on Online learning is very effective for me

Moreover, regarding the questions specific to Canon PLAY features and experience, overall responses show that the respondents were satisfied with the simulator (80.8%). Around 87% agree that it is easy to use, 91.5% agree that it has a friendly interface and 93.6% agree that it has demonstrated a clear photography concept. Figure 3 shows the students' confidence to explore DSLR cameras after using the simulator, where 91.2% either agree or strongly agree and only less than 10% disagree or indifferent.

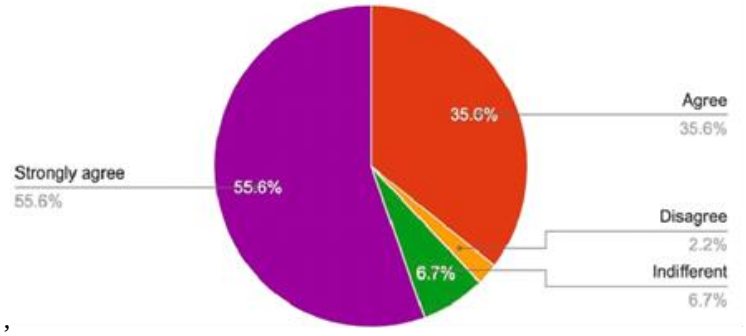

Figure 3. Response on I can explore DSLR camera by myself after using this app

Proposal for VR based Photography Training Simulator

From the analysis, we found that only two simulators utilize VR as their medium. Motivated by this, we propose the interface for our proof of concept as below (Figure 4):

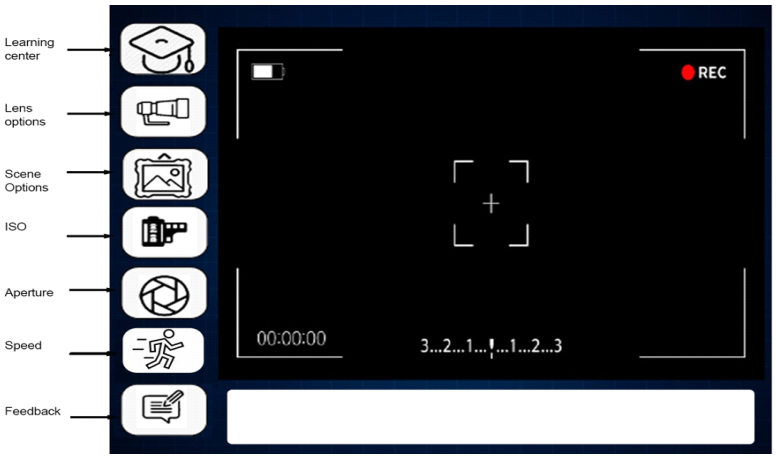

Figure 4. Interface for our proposed VR based Photography Training Simulator

Figure 4 shows our proposed simulator interface that the user will view from the VR headset and interact with the application. The main interface consists of the learning centre, lens options, scene options, ISO, aperture, speed and feedback. Assisted by three senses: audio, visual, and motion, users can experience the immersive environment and realistic scene. Figure 5 gives an illustration of a user who is using the application. The lifelike virtual environment is designed using Unity3D editor, which consists of realistic scenes, animated subject matters, and optional time, whether day or night.

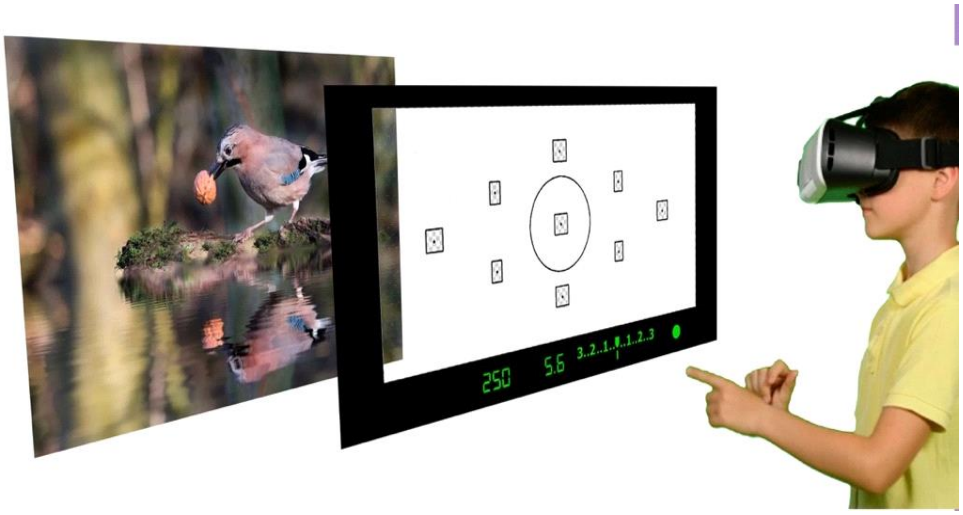

Figure 5. Illustration of a user who is using the application

This application uses a standard VR headset that supports Unity3D like Oculus Quest 2. Oculus Quest 2 is a wireless VR headset that supports up-to-date VR games and applications (Wills, 2020).

Conclusion and Future Work

This paper proposes an online interactive simulator that implements virtual reality technology to learn photography course, enabling students to learn photography at their own time without attending a physical class. The proof of concept is presented based on the analyses of 10 existing online simulators. This is stage one of the developments where the elements, interface and functionality are discussed. In this research, our survey results show that immersive simulator can propagate a high level of engagement, like learning practical courses online and virtually. Currently, most digital camera simulators are web-based, and minimal numbers are virtual and immersive.

Furthermore, with support from the main IT player like Facebook CEO's statement that mentions VR/AR could eventually replace all screens (Greengard, 2019), from smartphones to TVs, we believe this device will emerge as a promising, affordable consumer technology (Anderson, 2019; Waycott et al., 2018) and accessible to everyone one day. Finally, we hope the next stage of development is successful, where we can develop a working prototype of our VR camera simulator and test its implementation in the actual scenario.

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