9th INDES 2020

LIMITLESS MIND:

EMPOWERING INNOVATION THROUGH VISUALIZATION

Cawangan Perak

UNIVERSITI TEKNOLOGI MARA

PROGRAM
PROCEEDINGS
ABSTRACTS BOOK

The 9th International Innovation, Invention & Design Competition
INDES2020

17th May – 10th October 2020

AUGMENTED REALITY COLORING BOOK

Nurul Ain Shafawani Shahimi, Hazrati Zaini, Nurbaity Sabri, Nur Farahin Mohd Johari and Norshahidatul Hasana Ishak

Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Jasin, Melaka, MALAYSIA

E-mail: ainsfwnh@gmail.com

ABSTRACT

Children can benefit from using mobile technologies in classroom for learning purposes. A few studies mentioned there exists a lack of technologies applied at schools. Creating entertaining educational books not only requires visually stimulating content but also means for student to interact, create, and express themselves. Many researches indicates that use of augmented reality technologies in teaching helps children to get motivated and engaged and it is beneficial for children's memory retention. In this paper, a new type of mixed-reality book experience, which augments an educational coloring book with user-generated three-dimensional content is presented. This study aims at creating an augmented reality (AR) book for 4-6 years old children and on the understanding of how AR can affect engagement and how it can support and help learning coloring in terms of memorization. Engagement testing was conducted on 30 students based on Student Engagement Scale (SES) which are divided into categories of emotional, cognitive and behavioral of the students while using the application. The analyzed results point out towards the fact that AR could help children of preschool age in classroom education by positively affecting their coloring skills, memory retention and increasing their engagement and motivation.

Keywords: coloring, children, AR, learning, engaging

1. INTRODUCTION

Given the abundance and popularity of interactive media, real-world activities such as coloring using conventional books appears awkward, because children become less involved in them [1]. However, the introduction of augmented reality (AR) books has opened many eyes that books can be interactive and engaging such as MagicBook [2]. AR books are considered to be a big leap forward that will help the public crack the divide between digital and tangible worlds [3]. The objectives of the project are to design 3D models of few transportations, develop coloring book for children by using AR technology and evaluate user's engagement in using AR coloring book. The goal is to provide the children with an interactive environment.

2. METHOD

ADDIE model has been chosen as the methodology. It is used by many professional instructional designers for technology-based teaching [4]. It comprises of five phases which are Analysis, Design, Development, Implementation and Evaluation. During analysis phase is when all the sources from the online database has been analyzed and the goals and the problems of the project is achieved. The timeline has been created by using Gantt chart. Design phase started with designing the storyboard, flowchart of the application, and modeling the 3D objects for transportation category. In the development phase, Unity and Vuforia software has been used to create the AR coloring book. Implementation phase is where the application is delivered

through the Android mobile platform. Lastly the testing phase is where the Student Engagement Scale has been distributed to evaluate children's engagement towards the project.

3. TESTING AND RESULTS

About 30 participants age between 4 to 6 years old were involved during engagement testing. They were given the coloring page for the children to color. After that their teacher guided them to use AR camera to scan their marker. They are also provided with buttons on the screen to interact with the application. As a result, they can see their colored images on the screen. Next, questionnaire were distributed to evaluate. The questionnaire comprises of 10 questions that uses Likert Scale with emoji rating 1-5 because it is much easier for children to understand. Engagement testing evaluates three categories which are emotional, cognitive and behavioral. Figure 1 shows the total mean for each category.

Emotional engagement			4.0222
	1. Do you like this application very much		3.9667
	2. Do you feel excited when the 3D images appear?		4.1667
	3. Do you feel happy if this application implements		3.9333
Cognitive Engagement			3.6
	1. I can learn more other than colouring		3.5
	2. I give all my attention to complete the task		3.4333
	3. I can easily understand the pronunciation of the		3.8667
Behavioral Engagement			3.4778
	1. It is easy for you to use this application		3.3
	2. It is easy for you to understand the instruction in		3.4667
	3. I can improve my colouring skills by using this ap		3.6667
Total mean average			3.7000
Percentage evaluation of engagement			74%

Figure 1. Total Mean Average

From the percentage value that has been obtained, it can be concluded that engagement that has been evaluating in application that has been developed reached more than half of percentage. This shows that it is highly engage towards the users.

4. CONCLUSION

Augmented Reality Coloring Book through mobile application was developed for preschoolers to teach them on how to color through augmented reality which allowed them to view things in 3D perspective view. This application creates engagement and exciting environment compared to the traditional coloring book when user use it. User can interact with the buttons in augmented reality to hear sound, read info and to hear an audio. With this, it will give preschoolers new experience with coloring and coloring seems more fun. ADDIE model have five phases of structured instructional design. It acts as a guideline to help developer in designing and develop this project until it is completed. The analyzed result shows that the majority preschoolers were satisfied with this application and they seems engaged with it. Using iOS for the mobile platform can be consider as future work.

REFERENCES

1. Magnenat, S., Ngo, D. T., Zünd, F., Ryffel, M., Noris, G., Rothlin, G., Marra, A., Nitti, M., Fua, P., Gross, M., & Sumner, R. W. (2015). Live Texturing of Augmented Reality Characters from Colored Drawings. IEEE Transactions on Visualization and Computer Graphics, 21(11), 1201–1210. https://doi.org/10.1109/TVCG.2015.2459871
2. Clark, A., & Dünser, A. (2012a). An interactive augmented reality coloring book. IEEE Symposium on 3D User Interfaces 2012, 3DUI 2012 - Proceedings, May 2014, 7–10. https://doi.org/10.1109/3DUI.2012.6184168
3. Yuen, S. C.-Y., Yaoyuneyong, G., & Johnson, E. (2011). Augmented Reality: An Overview and Five Directions for AR in Education. Journal of Educational Technology Development and Exchange, 4(1). https://doi.org/10.18785/jetde.0401.10
4. Balaji, S. (2012). Waterfallvs V-Model Vs Agile : A Comparative Study on Sdlc. 2(1), 26–30.

Universiti Teknologi MARA
Cawangan Perak
Kampus Seri Iskandar
32610 Bandar Baru Seri Iskandar,
Perak Darul Ridzuan, MALAYSIA
Tel: (+605) 374 2093/2453 Faks: (+605) 374 2299

UNIVERSITI
TEKNOLOGI
MARA

Surat kami : 700-KPK (PRP.UP.1/20/1)
Tarikh   : 30 Ogos 2022

YBhg. Profesor Ts Sr Dr Md Yusof Hamid, PMP, AMP
Rektor
Universiti Teknologi MARA
Cawangan Perak

YBhg. Profesor

PERMOHONAN KELULUSAN MEMUAT NAIK PENERBITAN UiTM CAWANGAN PERAK MELALUI REPOSITORI INSTITUSI UiTM (IR)

Perkara di atas adalah dirujuk.

2.   Pihak Perpustakaan ingin memohon kelulusan YBhg. Profesor untuk membuat imbasan (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.

3.   Tujuan permohonan ini adalah bagi membolehkan akses yang lebih meluas oleh pengguna Perpustakaan terhadap semua bahan penerbitan UiTM melalui laman Web PTAR UiTM Cawangan Perak.

Kelulusan daripada pihak YBhg. Profesor dalam perkara ini amat dihargai.

Sekian, terima kasih.

"WAWASAN KEMAKMURAN BERSAMA 2030"

"BERKHIDMAT UNTUK NEGARA"

Yang benar