

## 21<sup>st</sup> CENTURY LEARNING THROUGH AR APPLICATION IN TEACHING AND LEARNING ENGLISH

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### Abstract

The introduction of 21<sup>st</sup> Century Learning in Malaysia (PAK21) which is driven by five main elements, which are communication, collaboration, critical thinking, creativity and values and ethics also requires educators to bring PAK21 methodologies into realizing 21<sup>st</sup>-century ready classrooms. One example of 21<sup>st</sup> century methodologies in the teaching and learning process is the use of mixed-reality technology which consists of Augmented Reality (AR) and Virtual Reality (VR). With the advancements of 21<sup>st</sup> century technology, AR technology, which before was considered as a high-requirement facility to be implemented in classrooms, is now easily accessible to all through affordable and capable devices with highly user-friendly software to develop AR content. Previous research has shown that the use of AR in classrooms is able to provide learners with immersion and potentially increase interest and motivation in learning. Therefore, this study aims to examine the effectiveness of AR usage, together with a textbook in the process of learning English through providing additional content and information. A focus group discussion was carried out with fellow researchers from UiTM Perak to gain further insights in developing AR content effectively for English lessons. A set of questionnaires was also distributed to 300 selected undergraduate students from various faculties. The findings were later analyzed using SPSS tools. The contribution of this study is hoped to be a useful indicator for further developments in 21<sup>st</sup> Century English teaching tools.

**Keywords:** 21<sup>st</sup> Century Learning, Augmented Reality, English, Technology, Education

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## INTRODUCTION

Augmented Reality (AR) technology is identified as an application acts as a tool to attract more interest and motivations among the higher institutions' learners, creating a new platform in the process of teaching and learning the language. Defined by Mark Billinghurst (2002) in his article entitled Augmented Reality in Education, AR allows an opportunity for its user to visually experience the virtual imagery or objects in the real world by computer-generated in a

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real-time. This new innovative learning in education at Malaysia allows the users to see the real world, with virtual objects superimposed upon or composited with the real world. AR for interactive learning in education is the greater context of immersive virtual learning environment which mundane space is turned into a vibrant educational experience through the use of advanced technology. AR is commonly capable of overlaying computer graphics onto the real world and allows users to see the real world simultaneously as virtual imagery attached to real location and objects (Kaufman, 2003).

The development of web-based platforms and materials and the advancement of internet connectivity and accessibility also bring online teaching and learning resources. Most higher learning institutions' libraries in Malaysia have already provided an online database of their e-textbooks. (Balog & Pribeanu, 2010) found that students do appreciate the advantageous features of web-based materials. At the same time, printed textbooks are still preferred for confidence and comfort when using them in their learning process. Some people still favour the physical presence of a textbook in front of them while learning or teaching, and the feeling of flipping through the pages of a textbook can never compare to swiping on a phone screen or clicking a mouse. This has inspired "21st Century Learning through AR Application in Teaching and Learning English" project to familiarise teachers and students with the usage of Augmented Reality technology in teaching and learning English and benefiting from having a physical textbook at the same time. The AR content applied in the English textbook is meant to complement the experience of using the textbook and act as an extension to the contents of the textbook. Therefore, this research was carried out to investigate the usage of Augmented Reality with the reference textbook used in teaching English for Communication 1, a university core course for UniSZA undergraduate students. The English textbook incorporates Augmented Reality resources, developed to supply the reference for teaching and learning of English Communication 1 topics covering all the language elements- reading, speaking, writing and reading.

## **METHODOLOGY**

### **Research Context**

This research approached higher institution students from University of Sultan Zainal Abidin (UniSZA). As the 18th public institution of higher learning in Malaysia, it is considered as the most prominent "Comprehensive University" in the East Coast of Peninsular Malaysia. The institution offers diverse courses catering for various Diploma, Undergraduate, and Postgraduate Studies. 300 undergraduate students had participated in this study. In this research context, the classrooms' natural setting and the participants' personal information were well-kept and maintained private.

### **Research Participants and Sampling Design**

Purposive sampling was randomly taken by first-year degree students who had particularly used AR applications in their PBI10102 English textbooks. The computed sample size for this study is 300 samples, complying with the range of sample size recommendations by (Burn, Veeck & Bush, 2017) who suggested that the sample size be between 96 and 384. Being selective for participant involvement was due to the intention of completing the information needed in order to fulfil the two research objectives:

- i. To develop AR application in the English reference book for the teaching and learning purpose.
- ii. To determine the effectiveness of AR application towards the teaching and learning experience at Higher Education Institution

First of all, to answer Research Objective (i), a focus group discussion was held via online meeting (refer to the appendix A). This was the exit plan after a physical visit had to be cancelled due to the pandemic reasons. Below are the details of the focus group discussion.

Table 1: Details of the focus group online discussion

Date	23 July 2020
Time	2.00 – 3.30pm
Platform	Google Meet
Panellist	Dr Airil Haimi Mohd Adnan (Main Panellist) Mr Muhammad Khairul Ahmad
Biography of the panellist	Pensyarah Kanan UITM Perak, Graduate Technologist, MBOT Malaysia; Former Advisor for Learning Technologies, University of Auckland, Aotearoa New Zealand

Next, 300 undergraduate students had been selected to answer the questionnaire to collect data for the research objective (ii). unfortunately, only 297 of the questionnaires were completely filled in. The table below shows the information of the participants involved in this research.

Table 2: Details of the participants to answer the questionnaire

Program	Number of Students
Usuluddin	104
Diethetics	28
Syariah	84
International Relations	52
Industrial Design	32
TOTAL	300

### Research Instrument

Three hundred undergraduates undertaking the English Communication 1 Semester 1 2019/2020 were asked to fulfil this questionnaire, which was first developed by (Mathwick, 2001) to explore the teachers' opinions and perceptions about using AR in classrooms.

The survey consists of 40 questions from three sections allocated. The first five questions gathered information on the participants' demographic, followed by the second section; students' perceptions on the AR used. The last section was where the participants were asked about the effectiveness of the AR in the textbook the used to refer throughout the semester. Prior to this evaluation, a pilot study was successfully conducted to the 30 students randomly taken from the classes involved.

## **Research Procedure**

This research was held for one semester complete (6 months) in order to collect the data. First of all, the pilot study was carried out to see the reliability of the questionnaire. Afterwards, some adjustments had been done before the distribution. The questionnaire was distributed at the end of the teaching week (week 13) since all the students had the experience in using the AR in their current PBI10102 textbook used. The distribution and data collection were done by the researcher physically in the classrooms with the participants to supervise and monitor the process of data collection.

At the other part, a focus group discussion was held via online meeting due to the pandemic. The discussion was primarily intended to share some experience of the panelist on conducting his project called “ELSA-360” which used VR technology. The discussion brought also had given tremendous fruitful ideas on conducting AR in the teaching materials. Many recommendations and tips given have helped this current project to be successfully developed.

## **Data Analysis**

The data collected used several statistical analyses using the Statistical Package for Social Science program (SPSS version 22). First of all, reliability analysis was conducted to measure the questionnaire’s internal reliability using the Cronbach’s Alpha value for effectiveness of reading skill, writing skill and speaking skill calculated as 0.941. These values indicate that all constructs in this study satisfy internal consistency requirement since the Cronbach’s alpha values for each construct are more generous than 0.7, as suggested by (Hair, 2014a). The data on the effectiveness of the AR used in the textbook for the language skills (reading, writing, and speaking) then was analysed using the mean table.

## **FINDINGS AND DISCUSSION**

### **Effectiveness of AR Usage in PBI10102 Textbook**

Technology-related learning is now becoming a trend. Various fields are utilising technology which includes education and opportunities for learning via technological tools are wide spread. The mobility and simplicity of the mobile gadgets allows for more effective learning and retainment of knowledge (Balog & Pribeanu, 2010). With the use of AR application in textbook, students should be able to enhance their learning environments and improve their ability to retain information.

This study was conducted to get a better understanding of the use of AR in the context of higher education institution. We examined the effectiveness of AR especially in ESL learning. It is important to identify the effectiveness as to prepare for technology-ready learning materials in the future.

For us to understand how AR can be used in educational settings, Bilingurst and Duenser (2012) proposed that an evaluation of the AR experience would be beneficial to recognise the potential for this technology in enhancing the traditional learning materials. In this study, the students’ feedback of their experience with the usage of AR application in PBI10102 textbook was explored.

Table 3: Means of effectiveness of AR usage in PBI10102 textbook

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
Mean	3.9	3.8	3.9	4.0	3.9	4.0	3.8	3.7	3.9	3.9	3.9	4.0	4.0
	32	72	66	13	46	30	18	87	66	59	83	37	57
	7	1	3	5	1	3	2	9	3	6	2	0	2
N	29	29	29	29	29	29	29	29	29	29	29	29	29
	7	7	7	7	7	7	7	7	7	7	7	7	7
Std.	.79	.95	.80	.77	.85	.76	.77	.80	.80	.73	.82	.81	.78
Devi	83	35	04	53	25	83	58	46	88	86	79	49	84
ation	4	5	7	5	4	1	6	2	7	9	7	6	9

To examine the feedback from the students on the effectiveness of AR application used in the textbook, a set of questionnaires was distributed, and the results are shown in Table 3 above. The table summarises the students' responses to the effectiveness of AR usage in PBI10102 textbook. The results of the descriptive analysis show that all 13 items are with means above 3.00. And of all the statements, item number 13 (*the use of AR application in this textbook needs to be continued in the future*) has the highest index of 4.0572.

As for the element of motivation, most of the students showed a high level of mean score for item number 11 (*AR motivates me to learn other English courses*) where it implies that students are more motivated to learn where there is the employment of AR application in learning materials. This finding is in line with those in other studies such as Martin-Gutierrez and Contero (2011), who found that the university students possessed stronger motivation in settings with AR presentation when using traditional class notes with static images. Another study by Di Serio, Ibanez and Kloos (2013) found that motivation element was better rated in an AR-based learning environment than in slides-based learning environment. Simply put, the factor of motivation can be highlighted in AR-related learning.

Generally, from the findings, it can be clearly seen that the students' feedback towards the AR textbook in this study were positive. In particular, they considered the use of AR application in the textbook needs to be continued in the future. These responses may indicate that the students had more interest in experiencing the possibility of AR technology to enhance their learning. In other words, the new way of interaction resulting from merging book content and digital information is likely more attractive for students.

**Effectiveness of AR Usage in Learning Reading, Writing and Speaking Skills**

Table 4: Means of Effectiveness of AR Usage in Learning Reading, Writing and Speaking Skills

		Effectiveness of AR usage in learning reading skills	Effectiveness of AR usage in learning writing skills	Effectiveness of AR usage in learning speaking skills
AR content helps to better understand the topics	mean	3.9933	3.9966	3.9529
	Std. Deviation	.74884	.79482	.79979
AR content provides additional information which are not printed in the textbook	mean	3.9630	3.9226	3.9293
	Std. Deviation	.75916	.76498	.76121
AR content provides additional information which are not taught in class	mean	3.9360	3.9091	3.8889
	Std. Deviation	.78797	.77229	.79554
AR content encourages me to apply the provided knowledge	mean	3.9697	3.9798	4.0168
	Std. Deviation	.79849	.77083	.77310

Using the descriptive analysis, this study also explored on the students' responses towards the use of AR in relation to 3 subskills in English language learning, namely reading, writing and speaking. In the same set of questionnaires, but in separate section, four items were used in determining the effectiveness of AR. The results are shown in Table 4 above.

Students responded that for item number 1 (*AR content helps to better understand the topic*), both learning reading and writing skills were rated as having a high level of mean. It implies that the textbook content with the AR application can improve students' understanding in learning language skills.

The results concur with Jamrus and Razali (2019) whose study concluded that implementing an immersive environment to read, compared with the traditional black and white text, will increase students' intrinsic motivation in reading which will be beneficial for teachers and students in the teaching and learning of English reading in the classroom. It is believed that based on the students' feedback, AR application can make the learning material practical for the students.

Additionally, according to a study conducted by Allagui (2019), the use of the AR-enhanced prompt had led to a moderate increase in students' overall writing performance score. The finding of that study corresponds with the result obtained from Table 4. It is possible that the AR-enhanced prompt kept the students focused intensively on the content of writing. It was also mentioned that it is important to identify technology devices that can motivate students who find learning to write difficult since writing performance is strongly related to success in higher learning institution. Also, in Liu and Tsai's (2013) study, in addition to linguistic knowledge, the AR-based mobile learning material supported students in gaining content knowledge related to the composition subjects.

The most significant feedback from the result is for speaking skill in relation to item number 4 (*AR content encourages me to apply the provided knowledge*) by having the highest mean which is 4.0168. It shows that AR application usage is effective and beneficial for

students in improving their speaking skill. This finding can be related to the element of anxiety when it comes to participating in speaking activities. In many occurrences, anxiety exists among students when they are asked to speak in classrooms (Hashim & Isa, 2012). As such, it is a promising prospect to have AR application usage in teaching materials, particularly language learning, in overcoming the sense of anxiety among language learners.

Another significant finding noticeable from Table 4 is that item number 3 (*AR content provides additional information which are not taught in class*) received the least mean for all the three skills. This was probably due to the students' perception that both traditional book and AR application work together as an item or unit.

All in all, these results are interesting for a number of reasons. They propose that AR should be embedded in English learning classroom to fully engage students and achieve desirable learning outcomes. The results also suggest that AR application can be an effective supplementary source to facilitate the process of learning English language skills. Thus, the use of PBI1012 textbook that incorporates the AR application can be seen as an effective medium in enhancing the process of language learning.

These research findings can be concluded as a straightforward interpretation - the perception of the students have strongly impacted the effectiveness of the AR used in language learning. Many research in the past had been discussed on the student's perceptions towards the AR used in the classrooms and they shared similar findings. AR was positively accepted by the students, and AR was defined as a useful tool to help students learn the language better. (Hair, 2010) (Malaysia, 2012). Therefore, to enhance the effectiveness of the AR application in the future, some consideration needs to be taken on the students' perceptions.

First, for the students to have a good perceived ease of use of the AR application, they should prioritize their devices to connect with the application. To navigate better the AR application, the devices used must be fit to install the application and have good access to the internet; therefore, this will increase the effectiveness of using the AR application. (Malaysia, 2012) recommended that the students should have more suitable devices so that they can use the application at ease. Not restricted to use the application inside the classroom and during the class hour, but the students can also independently learn the language through the application outside the classroom. Other than that, students are better to expose themselves with more language learning application to enhance their experience in using AR application. (Hair, 2014) had identified that sometimes the AR usage for HP Reveal was interrupted due to the rendering of the 3D material model used. Hereby, students should learn how to tackle the issue. They might want to discover the appropriate distance between the webcam and the target marker, or perhaps adjust the lighting and the webcam resolution. Therefore, this will increase the effectiveness of using AR in their language learning experience. All in all, to enculturate the 21<sup>st</sup> century learning through the AR application at higher education institution will be effectively practiced if both educators (content creator) and the students (users) could cooperate and try to reach the best perception on AR application in language learning.

## REFERENCES

- Abd Majid, N. A., et al. (2015). "Students' perception of mobile augmented reality applications in learning computer organization." *Procedia-Social and Behavioral Sciences* **176**: 111-116. <https://doi.org/10.1016/j.sbspro.2015.01.450>
- Allagui, B. (2019). Writing a Descriptive Paragraph Using an Augmented Reality Application: An Evaluation of Students' Performance and Attitudes. *Technology, Knowledge and Learning*. <https://doi.org/10.1007/s10758-019-09429-2>

- Balog, A. and C. Pribeanu (2010). "The role of perceived enjoyment in the students' acceptance of an augmented reality teaching platform: A structural equation modelling approach." *Studies in Informatics and Control* **19**(3): 319-330. [https://DOI: 10.24846/v19i3y201011](https://doi.org/10.24846/v19i3y201011)
- Billinghamurst, M. (2002). Augmented reality in education. *New horizons for learning*, 12(5), 1-5.
- Billinghamurst, M., & Duenser, A. (2012). Augmented Reality in the Classroom. *Computer*, 45(7), 56–63. <https://doi.org/10.1109/MC.2012.111>
- Burn, A. C., Veeck, A., & Bush, R. F. (2017). *Marketing Research (8th ed.)*. Malaysia: Pearson Education Limited.
- Cakir, R., & Solak, E. (2015). Exploring the effect of materials designed with augmented reality on language learners' vocabulary learning
- Carreon, A., et al. (2020). "Augmented Reality: Creating and Implementing Digital Classroom Supports." *Journal of Special Education Technology* **35**(2): 109-115. <https://doi.org/10.1177%2F0162643419882423>
- Contero, M., & López, D. (2013). Delivering Educational Multimedia Contents through an Augmented Reality Application: a Case Study on its Impact on Knowledge Acquisition and Retention (Vol. 12).
- Delello, J. A., McWhorter, R. R., & Camp, K. M. (2015). Integrating augmented reality in higher education: A multidisciplinary study of student perceptions. *Journal of Educational Multimedia and Hypermedia*, 24(3), 209-233.
- Di Serio, Á., Ibáñez, M. B., & Kloos, C. D. (2013). Impact of an augmented reality system on students' motivation for a visual art course. *Computers & Education*, 68, 586–596. <https://doi.org/10.1016/j.compedu.2012.03.002>
- Hair, J. F., Black, W. C., Babin, B. J. & Anderson, R. E. (2014a). *Multivariate Data Analysis (7th ed.)*. United States: Pearson Education Limited.
- Hashim, H., & Isa, I. S. M. (2012). Students' anxiety level towards speaking in English: Malaysia polytechnic experience. *2012 IEEE Symposium on Business, Engineering and Industrial Applications*, 595–599. <https://doi.org/10.1109/ISBEIA.2012.6422957>
- Hsieh, M. C. (2016). Teachers' and students' perceptions toward augmented reality materials. In *2016 5th IIAI International Congress on Advanced Applied Informatics (IIAI-AAI)* (pp. 1180-1181). IEEE. <https://doi.org/10.1109/IIAI-AAI.2016.39>
- Jamrus, M. H. M., & Razali, A. B. (2019). Augmented Reality in Teaching and Learning English Reading: Realities, Possibilities, and Limitations. *International Journal of Academic Research in Progressive Education and Development*, 8(4), Pages 724-737. <https://doi.org/10.6007/IJARPED/v8-i4/6696>
- Kaufmann, H. (2003). Collaborative augmented reality in education. Institute of Software Technology and Interactive Systems, Vienna University of Technology.
- Li, K.-C., Chen, C.-T., Cheng, S.-Y., & Tsai, C.-W. (2016). The Design of Immersive English Learning Environment Using Augmented Reality. *Universal Journal of Educational Research*, 4(9), 2076–2083. <https://doi.org/10.13189/ujer.2016.040919>
- Liang, M. J. R., Eng, D., & Angb, W. (n.d.). *Factors Impacting Virtual or Augmented Reality Effectiveness in Training and Education*. 14.
- Liu, P., & Tsai, M., (2013). Using augmented-reality-based mobile learning material in EFL English composition: An exploratory case study <https://doi:10.1111/j.1467-8535.2012.01302.x>
- Malaysia, K. P. (2012). Malaysia Education Blueprint 2013-2025. Kementerian Pelajaran Malaysia.
- Martin-Gutierrez, J., Guinters, E., & Perez-Lopez, D. (2012). Improving Strategy of Self-Learning in Engineering: Laboratories with Augmented Reality. *Procedia - Social and Behavioral Sciences*, 51, 832–839. <https://doi.org/10.1016/j.sbspro.2012.08.249>



- Mathwick C, Rigdon Malhotra NK (2001). The effect of dynamic retail experiences on experiential perceptions of value: an Internet and catalog comparison. *J. Retailing*, 78(1): 51-60 [https://doi.org/10.1016/S0022-4359\(01\)00066-5](https://doi.org/10.1016/S0022-4359(01)00066-5)
- Mayer, R. E. (1997). Multimedia learning: Are we asking the right questions? *Educational psychologist*, 32(1), 1-19. [https://doi.org/10.1207/s15326985ep3201\\_1](https://doi.org/10.1207/s15326985ep3201_1)
- Puentedura, R. (2006). Transformation, Technology, and Education, Retrieved 27 May 2016, from [http://hippasus.com/resources/tte/puentedura\\_tte.pdf](http://hippasus.com/resources/tte/puentedura_tte.pdf)
- Sural, I. (2018). "Augmented Reality Experience: Initial Perceptions of Higher Education Students." *International Journal of Instruction* **11**(4): 565-576.