

## EVALUATING UI/UX OF PHONETICS AUGMENTED REALITY

**Afriliani<sup>1\*</sup>, Agus Riyanto<sup>2</sup>, Yudi Efendi<sup>3</sup>, Ni Putu Meri Dewi Pendi<sup>4</sup>, Widyasari<sup>5</sup>,  
Enggar Mulyajati<sup>6</sup>, Ardik Ardianto<sup>7</sup>**

*1, 2, 3, 4, 5, 6, 7 Universitas Terbuka (INDONESIA)*

\*afriliani@ecampus.ut.ac.id

Received: 09-01-2024 Accepted: 05-02-2024 Published: 03-06-2024

### **Abstract**

This study aimed to evaluate augmented reality of phoneme. This study followed an observation-discussion process in which the researcher provided applications and checklists to the participants. Participants were asked to operate the application and fill out a checklist where the researcher discussed the use of the application. The research results show that participants are satisfied with the UI display and want minor improvements so that the display is better and equipped with more complete information. while for UX, participants agreed that the application was easy to use and helped the learning process. From the trial, the researcher summarized several things that needed to be corrected and errors that had not been detected before, such as speech errors. The author presents follow-up results from the last part of AR application development. The results of this trial are the final stage which answers whether this application is feasible to be launched.

Keywords: augmented reality, English phonetics, linguistics, phonemes, and vocal cord

### **1 INTRODUCTION**

As students become increasingly interested in taking part in distance learning at Universitas Terbuka, university feels the urge to improve the student learning experience in distance mode. The way to improve the learning experience is to enrich open-source materials and update learning aids be better. To enhance the quality, the integration of technology, specifically Augmented Reality (AR), is a promising avenue. AR, defined as the overlay of digital elements like images, sounds, and videos onto real-world contexts as perceived through computer input devices or embedded systems (Abbas Ahmed, 2014), holds the potential to revolutionize language learning and education in general.

AR technology in education fosters increased engagement among students, teachers, and learning materials. It enables dynamic interactions with educational content, ultimately enhancing the teaching and learning processes, as evidenced by the findings (Karacan & Akoğlu 2021). Given the anticipation that Augmented Reality (AR) will bridge the gap in interactions between students and lecturers in distance learning, especially in cases where

physical meetings with lecturers are infrequent and considering that language learning often thrives with a learning partner, AR emerges as a viable solution.

One may wonder why AR is considered essential in education. According to Nihra et al. (2007), AR's value lies in its ability to help students visualize complex or abstract concepts in a more intuitive manner, thus promoting deeper understanding among learners. The students' understanding of phoneme and phonetic in the English sound system is the learning barrier in this instance. We are aware that sound cannot be seen and can exist in an abstract state without any sort of simulation or images. The location and manner by which a phoneme is produced may confuse students. So that, learning phoneme needs visual and verbal assistance. According (Hulme et al., 2007) Variations in the capacity to learn visual-verbal associations may very well contribute to children learning to read in a way that is distinct from measures of phonological ability. It can be concluded that learning language in depth of reading and phonological ability need visual-verbal assistance. This rather difficult learning objective requires a simulation that can display the process of sound produced so AR technology was chosen.

AR has already found practical application in the field of language learning. Studies like the one conducted by Solak & Cakır, (2015) have harnessed augmented reality to introduce vocabulary to beginners, resulting in enhanced comprehension and motivation levels. The integration of AR into language education has the potential to revolutionize the way students engage with linguistic content, making learning more immersive and effective.

Although AR is excellent, it must be tested or evaluated as a tool. The elements of user suitability must be met by the developed AR. This study will disseminate the developed AR and determine whether it can be put to use. The development of evaluation is based on user experience, or UX. This evaluation rates the quality of the application under test as well as the extent to which it can be used. According to Koutsabasis, (2021) observing, measuring, and interpreting are the three steps that make up UX evaluation. So, the aim of this research is to find out to what extent AR can be used by English literature students.

## **2 METHODOLOGY**

In assessing the utility of an AR application, the evaluation of user experience becomes crucial. There are numerous stages and methods can be involved in measuring this. However, in this case, one of which is employing a quantitative approach through the administration of questionnaire. This questionnaire is designed by developers based on key criteria deemed

essential for operating the application effectively. The questions' purpose is to assess how capable students using the application by factor of the way they are browsing the menu, the way they scan the barcode, the practice of AR, following the exercise, and an open question as an input and as a round up comment of user experience. Each question used Likert scale (1-5). Here are the questions being asked:

*Table 2. Question list*

<b>Questions</b>
I can browse the menu by clicking the button in application
I can scan the barcode
I can practice pronouncing phonemes correctly
I can identify the location of the speech apparatus
I can follow the exercises in the application well
(Open question) give the comment about the UX !

A survey was conducted with 22 participants, all of whom are English Literature students residing in Jakarta and its surrounding area. These individuals were chosen as the sample group to provide insights and feedback on user experience of AR. Their responses, collected through a questionnaire, form a valuable dataset for our research. Both freshman students and ongoing students, some of whom have already taken the subject of linguistics (phoneme) developed through Augmented Reality (AR) and some who have not yet had the opportunity attend the class, are participating in the research.

*Table 2. Participants description*

<b>Participants</b>	<b>indicator</b>	<b>%</b>
has learned phoneme in Linguistic course	<i>yes</i>	45,45
	<i>no</i>	54,55
amount semester had been taken	<i>1 to 4</i>	50
	<i>5 to 8</i>	50

The questionnaire was administered on one-o-one discussions with researcher since it is also held by observation. The participants are given mobile phone to used. Then, the application is installed in a mobile phone. The result of this evaluation is to measure user experience, which the term "user experience" refers to all facets of how users engage with a product (Feng & Wei, 2019).

### 3 FINDINGS AND DISCUSSION

In running this evaluation of AR application, participants being asked to operate application and fill in questions that have been prepared by using online form. The researcher gave them direction to log in and asked them to read written tutorial on application before running it. Participants are given time to explore the application and they are being free to ask question to researcher if somehow there is technical issues arouse. Then, they begun to fill the answer of questionnaire based on their experience. After calculating, the result is presented as the following table:

*Table 3. Mean of Questionnaire*

<b>Questions</b>	<b>M</b>
I can browse the menu by clicking the buttom in application	4,77
I can scan the barcode	4,77
I can practice pronouncing phonemes correctly	4,73
I can identify the location of the speech apparatus	4,64
I can follow the exercises in the application well	4,77

Here we can see that the number of mean on each question doesn't have significance difference and all are above 4. Scale 4 is interpreted as agree that means all the participants agree that they are able to use the application well. Question number 1,2, and 5 have mean 4,77 as the highest score it gets. It concludes that students mutually agree that they are able in browsing menu, scanning the barcode, and following the exercise. As for question number 3 and 4, the means are slightly fewer. Question number 3 and 4 is about content of lesson that need more comprehension process rather than operating other menu in the application.

To summarize all the results of this user experience trial, overall statistic data was calculated (Table 4). The dataset consists of 22 data points, with a mean (average) value of approximately 4.77. The data exhibits a relatively low level of variability, as indicated by a small standard deviation of approximately 0.43. The median value, which represents the middle value when the data is sorted, is 5, and this aligns closely with the mode, which is also 5. The standard deviation is 0,33 that means that rating clustered closely around the mean. If we look at the range, minimum, and maximum. With a total of 104,2 ratings from 22 participants, it is obvious that the ratings varied between 4 and 5.

*Table 4. Statistic of UX Evaluation*

<i>UX Evaluation</i>	
Mean	4,74
Standard Error	0,07
Median	4,80
Mode	5,00
Standard Deviation	0,33
Sample Variance	0,11
Range	1,00
Minimum	4,00
Maximum	5,00
Sum	104,20
Count	22,00

Here we can see that the number of mean on each question doesn't have significance difference and all are above 4. Scale 4 is interpreted as agree that means all the participants agree that they are able to use the application well. Question number 1,2, and 5 have mean 4,77 as the highest score it gets. It concludes that students mutually agree that they are able in browsing menu, scanning the barcode, and following the exercise. As for question number 3 and 4, the means are slightly fewer. Question number 3 and 4 is about content of lesson that need more comprehension process rather than operating other menu in the application.

*Table 5. Participants Commentary*

<b>positive findings</b>	<b>feedback</b>
good and smooth	the images need to be enlarge
clear	need Indonesia translation
helpful	need crosscheck of the sounds
beneficial for self-learning	need more exercise
run normally	the sounds have to be louder

To summarize all the results of this user experience trial, overall statistic data was calculated (Table 4). The dataset consists of 22 data points, with a mean (average) value of approximately 4.77. The data exhibits a relatively low level of variability, as indicated by a small standard deviation of approximately 0.43. The median value, which represents the middle value when the data is sorted, is 5, and this aligns closely with the mode, which is also 5. The standard deviation is 0,33 that means that rating clustered closely around the mean. If we look at the range, minimum, and maximum. With a total of 104,2 ratings from 22 participants, it is obvious that the ratings varied between 4 and 5.

*Table 4. Statistic of UX Evaluation*

<i>UX Evaluation</i>	
Mean	4,74
Standard Error	0,07
Median	4,80
Mode	5,00
Standard Deviation	0,33
Sample Variance	0,11
Range	1,00
Minimum	4,00
Maximum	5,00
Sum	104,20
Count	22,00

Closed questions give rate of the application but not enough to give the feedback to develop better environment of application. So open questions are needed regarding experiences and feedback for improvement. The researcher concluded five things that often appeared in terms of impressions and responses (Table 5). The first finding is good and smooth that suggest that good and can be operated smoothly. Second is clarity of the goal of application and subject embedded. The third is clear means they participants understand with the lesson objectives contained in application. The fourth is helpful which mean the application is beneficial assisting the user learning lesson, especially phoneme. The last is beneficial for self-learning which suggest that the participant really feel helpful learning by themselves with this application since they have audio visual simulations for practice.

*Table 5. Participants Commentary*

<b>positive findings</b>	<b>feedback</b>
good and smooth	the images need to be enlarge
clear	need Indonesia translation
helpful	need crosscheck of the sounds
beneficial for self-learning	need more exercise
run normally	the sounds have to be louder

However, there are also suggestions for improvement in the feedback. The first is the object or product might be too small and would benefit from being made larger for better usability or visibility. It is also in line with the sound that need to be set on varied volume since some prefer louder than the current setting. Participants point out that some image is small and need to be

enlarge. Then, participant also suggest having translated form of exercise especially this comment come from freshman who just enter University. They also suggest adding exercise by its number of word and level of difficulty.

This evaluation is so useful for researchers and application developers in make and maintain this application. The researchers can fill knowledge gap that have to reach learning objectives while having experience to ask directly to the participants that will be future users. As for developer, it is beneficial to repair what are still lacking and error in application.

#### **4 CONCLUSION**

In conclusion, the evaluation AR yielded valuable insight and feedback. The participants' responses indicated a high-level satisfaction with AR's usability with mean score consistently above 4. Additionally, participants are giving feedback to improve experience in AR by correcting audio visual and technical matter. By this research, Researchers can now more closely correspond to the program's goals with their research interests, while developers can concentrate on resolving particular usability issues and incorporating user-driven improvements.

#### **ACKNOWLEDGEMENTS**

I would like to express my sincere gratitude and appreciation to LPPM UT who have contributed to the success of this project.

#### **REFERENCES**

- Abbas Ahmed, A. (2014). Augmented Reality, an Enabler to Self Organized Learning. *Computer Engineering and Intelligent Systems*, 5(6). [www.iiste.org](http://www.iiste.org)
- Feng, L., & Wei, W. (2019). An empirical study on user experience evaluation and identification of critical UX issues. *Sustainability (Switzerland)*, 11(8). <https://doi.org/10.3390/su11082432>
- Hulme, C., Goetz, K., Gooch, D., Adams, J., & Snowling, M. J. (2007). Paired-associate learning, phoneme awareness, and learning to read. *Journal of Experimental Child Psychology*, 96(2), 150–166. <https://doi.org/10.1016/j.jecp.2006.09.002>

- Karacan, C. G., & Akoğlu, K. (2021). Educational Augmented Reality Technology for Language Learning and Teaching: A Comprehensive Review. *Shanlax International Journal of Education*, 9(2), 68–79. <https://doi.org/10.34293/education.v9i2.3715>
- Koutsabasis, P. (2021). Evaluation in Virtual Heritage. In *Virtual Heritage: A Concise Guide* (pp. 115–127). <https://doi.org/10.5334/bck.k>
- Nihra, M., Said, H. M., Binti, N., Universiti, I., Malaysia, T., Darul, J., Zim, T. ', & My, N. (2007). OVERVIEW OF OPEN SOURCE AUGMENTED REALITY TOOLKIT. *1st International Malaysian Educational Technology Convention*, 1144–1149.
- Solak, E., & Cakır, R. (2015). Exploring the effect of materials designed with augmented reality on language learners' vocabulary learning. *The Journal of Educators Online-JEO*, 13(2).



