The Impact of the TOCFL Reading Mobile Application on the Reading Ability of Chinese Language Learners

Vincentius V. Jiuangga[1,*], Mei R. Chandra[1], Yi Ying[1], and Agatha A. Jiuangga[2]

[1] Chinese Department Faculty of Humanities, Bina Nusantara University, Jakarta, Indonesia
[2] Chinese Department Faculty of Language, Universitas Ma Chung, Jakarta, Indonesia
Email: vincentius.jiuangga@binus.edu (V.V.J.); mei.rianto@binus.ac.id (M.R.C.); Yi_Ying@binus.edu (Y.Y.);
agathaangelinalina@gmail.com (A.A.J.)
*Corresponding Author

Abstract—**This study aims to see the effect of the TOCFL Reading mobile application on improving Chinese learners' reading skills. The research was conducted on 20 students in semester two majoring in Information Systems at Private University in Malang. The method in this study was action research in which respondents were asked to work on 25 questions on the TOCFL reading test three times. In carrying out the reading test, respondents were given 50 minutes to complete 25 numbers. Twenty-five reading test numbers are given in the multiple-choice form. In the second reading test, there was an increase of 14.2 points from the average score of the first reading test, and in the third reading test, there was an increase of 10 points from the average value of the second reading test. The results of learning to read using the TOEFL Reading Application can be seen as an increase in students' reading skills. The limitation of this study is the limited number of respondents, so it is suggested for further research that the number of respondents is larger.**

Keywords—**mobile application, TOCFL, Mandarin learners, reading ability**

I. INTRODUCTION

In recent years China's economy has grown so fast; this has happened due to the expansion and increase in trade by Chinese companies with other countries in the world [1]. Apart from English, Mandarin is one of the international languages that are mandatory to learn. This is an opportunity for learners of Mandarin.

The abilities that students must have in learning Mandarin are listening, speaking, reading, and writing. To master these four skills, one of the essential things for Mandarin learners is that students can master a lot of vocabulary. In learning vocabulary, many Mandarin learners experience difficulties in reading Hanzi. Vocabulary is one of the essential elements that make up a language. In learning a language, especially Mandarin, students need to understand the meaning of a vocabulary and Han characters (Hanzi), Pinyin, and tones. With so many diverse vocabularies, many students find it difficult to learn Mandarin. Learning Mandarin requires a lot of memorization in acquiring vocabulary. Along with the rapid development of technology, learning media as learning aids are increasingly diverse [2]. In other words, learning is an effort made by educators to create learning activities that are conducive to achieving goals. For that, educators must have an effective approach when learning.

Learning is now entering the digital era. At this time, students find it difficult to accept Mandarin subject matter given by the teacher because the teacher only provides material only through textbooks. Traditional classroom instruction needs to provide a hands-on learning environment, and evaluation is quicker. Conversely, digital learning tools and technologies can make learners more active. Advances in Information and Communication Technology (ICT) or often referred to as a trend in the world of education [3]. The education system also needs help with problems caused by the digital era, required to be able to use digital technology [4]. Traditional learning methodologies cannot achieve some of the efficiencies provided by such technologies. With smartphones and other wireless technology devices becoming popular among the general public, educational institutions are making efficient use of them by placing technology in classrooms [5]. In learning Mandarin, the skills needed are listening, speaking, reading, and writing skills. It is difficult to master Mandarin, especially in reading Chinese, because each Han character has a different meaning. If a Han letter is combined with other letters, the purpose will also differ. Thus, to improve reading skills, Chinese language learners must read written Chinese frequently and do exercises to complete texts, complete sentences, and so on. With the development of technology, students can leave traditional learning methods and be replaced by learning to use application technology. One of the mobile application technologies developed for learning to read is the TOEFL Reading application.

The Test of Chinese as a Foreign Language (TOCFL) is a standardized set of Chinese language proficiency tests developed for foreign speakers outside of Mandarin. The

purpose of holding this test is to measure the reading ability of basic learners. The TOEFL Reading application is then used to teach Chinese learners to find out how much the learner's ability to read Chinese texts has developed.

II. CONCEPTUAL BACKGROUND

A. Mobile Learning

Learning is an activity carried out to acquire knowledge, master certain competencies, and shape students' attitudes. The success of learning can be seen from changes in behavior and student learning outcomes. There are many ways that teachers can do to foster student learning motivation. Using challenging learning strategies such as games can motivate students, and bringing contextual and fresh material or interactive media can stimulate them from within. Learning media that is used appropriately in the learning process will be a more effective and efficient supporting tool in achieving learning objectives [6].

E-learning is an education system that uses electronic applications to support the teaching and learning process using the Internet, computer networks, and stand-alone computers. The use of e-learning is a new learning process that can provide new experiences and convenience for students to motivate them to continue learning [7]. Multimedia or digital learning resources help learners to get a good mental representation by using different media elements that support information processing. Information, which consists of content and sometimes learning activities, is presented using a combination of text, images, video, and audio with digital learning resources [8].

Mobile technology has become an important element in our daily life. It has changed our lifestyle and, more importantly, our learning style. One of the new learning trends mentioned in the 2016 NMC Horizon Report is Bringing Your Own Device (BYOD), where students bring their laptop, tablet, or smartphone to class. Students can use devices they are already familiar with instead of the computers provided by the school. As of 2014, more than 42% of US colleges have adopted a BYOD strategy [9].

At present, mobile technology has developed widely and is attractive [10]. The term "mobile" itself stands for "mobility" or the ability to move freely and easily from one place to another [11]. Anyone can access mobile technology using a handheld mobile device such as a smartphone or tablet anywhere at any time. The rise of mobile technology also plays a role in education, especially in learning foreign languages. According to Chen [12], technology has changed every aspect of human life, and language learning is no exception. Technology has ushered in a new era of teaching and learning. Mobile technology provides a variety of resources and tools for language learning that encourage students to be more motivated, independent, socially engaged, and interactive [13].

B. Mobile Learning in Mandarin

Mandarin lessons require appropriate and fun learning models or methods in the learning process so that they can help students understand the information presented in class [14]. Online language teaching requires a new set of skills and approaches through which teachers can leverage the advantages of online platforms to provide online language learners with a positive and constructive learning experience. The tools and resources available online offer the opportunity to practice all of these skills at a more individualized pace with more authentic materials [15].

More than conventional face-to-face learning is needed to meet the demands of today's internet-based technology [16]. Using Mobile Learning Style combined with Active Mobile Chinese can help users learn/teach more easily and effectively [17]. Meanwhile, the increasing popularity of cell phones has made our lives more connected to the Internet. With the help of the Wi-Fi feature, fields such as d-learning and e-learning have been upgraded to mobile learning, and thus, ubiquitous learning has been made possible [18]. Vocabulary learning designs that support this method take advantage of the unique features of mobile devices: portability and mobility, which help learners gain access to learning content outside of school. Most of the mobile vocabulary learning designs are carried out from a behaviourist attitude [19].
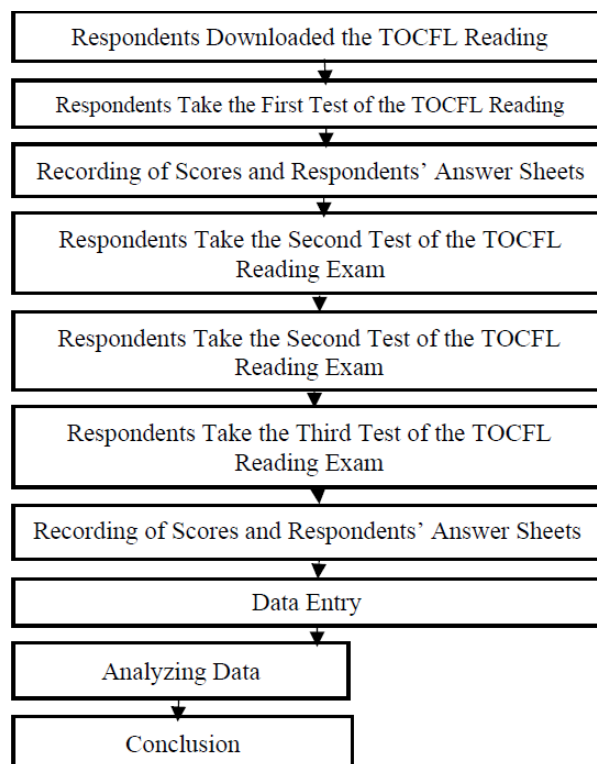
III. RESEARCH METHOD

Fig. 1. Research roadmap.

The subjects in this study were 20 Information Systems students who had studied Mandarin for one year. The method in this research is action research. Students are asked to work on reading basic-level Mandarin questions on the TOCFL reading mobile application as many as 25 numbers. The types of questions are divided into two types. In question numbers 1 to 15, respondents will be asked to choose the appropriate picture. In question numbers 16–25, respondents will be asked to choose the correct statement.

All questions are in the form of multiple-choice questions A, B, and C. Students are asked to work on the questions three times. The first assignment was carried out while the respondent was in class, the second exam was carried out on the second day the respondent worked at home, and on the third day, the respondent did the third test in class again. In working on the questions, the respondents were given 50 minutes. When students finish working, students are asked to take screenshots of the answers and grades. When the respondent has finished working, the respondent can only see the value but cannot know the correct answer. In Fig. 1, the research process in this study will be elucidated.

A. TOCFL E-Learning Interface

The TOCFL mobile application consists of several pages that the user can access. These features will make it easier for users to use the TOCFL mobile application. As seen in Figs. 2 and 3, they depict the initial interface of the application.

Fig. 2. Application start page.

Fig. 3. Display choose language.

In the initial view, at the top, there is a level. This image display is at the A1 Novice level. At the bottom, there are start buttons, instructions, and settings.

In Fig. 2, the user will be given the option to take the exam using traditional or simplified Chinese. The following are Figs. 4 and 5, illustrating the interface of the application's instruction page and the selection of learning classes.
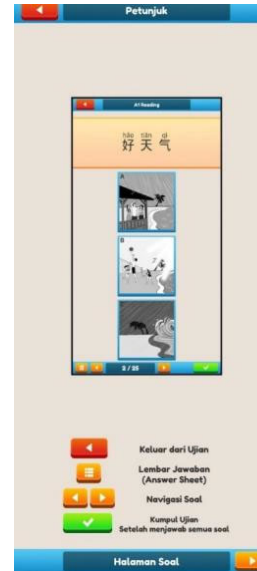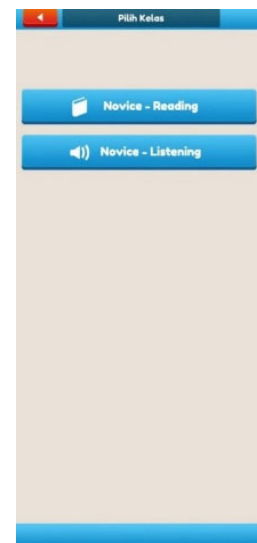

Fig. 4. Instructions page.

Fig. 5. Class select page.

The instructions page contains an explanation of each button, namely the exit button, the button to view the answer sheet, the question navigation button, and the button to collect answer sheets. In Figs. 6 and 7, you can observe the interface of the exam question-solving page.

Fig. 6. Question sheet A1 reading selecting a picture page.

Fig. 7. Question sheet A1 reading choosing statements.

The user can take a reading or listening exam on the "Select Class" page. If the user wants to take the Reading exam, they can press the "Novice-Reading" button, and if they want to take the Listening exam, the user can press the "Novice-Listening" button.

In the TOCFL exam, there are 25 item numbers. For numbers 1–15, this is a type of question where the user is asked to choose an image in options A, B, and C and then match it to the question in the question. The type of question for numbers 16–25 asks the user to choose statements A, B, and C that match the picture in the question. Figs. 8 and 9 represent the pages of the student's answer sheet upon completing the exam questions.

Fig. 8. Answer sheet display.

Fig. 9. Answer confirmation page.

On the "Answer Sheet" page, the user can see the answers that have been selected.

When the user presses the check button in the lower right corner, a pop-up will appear, asking the user to confirm whether they are sure to submit the exam answers. If yes, then the user can press the green yes button. If not, the user can press the red no button. In Figs. 10 and 11, the scores obtained by students upon completing the exam questions are depicted. Fig. 10 shows the scenario when a student does not pass, while Fig. 11 shows the scenario when a student passes.

Fig. 10. Failed exam results score page.

Fig. 11. Display of passed exam results.

Fig. 9 is an example of a picture when a respondent scores below 65 and does not pass the TOCFL reading test. Fig. 10 – Failed Exam Results Score Page is an example of when a respondent gets a score above or equal to 65 and is declared to have passed the TOCFL reading.

IV. RESULT AND DISCUSSION

Based on the test the respondent conducted thrice, the researcher can collect data which is then used as material for data analysis. Table I contains the scores of 20 respondents across 3 test attempts.

TABLE I.   RESPONDENT'S SCORE

Respondent	Test 1	Test 2	Test 3	Respondent	Test 1	Test 2	Test 3
1	68	88	92	11	76	100	100
2	96	96	96	12	60	92	100
3	60	72	80	13	52	52	72
4	44	68	88	14	40	64	80
5	76	84	100	15	56	84	88
6	80	88	96	16	36	76	92
7	72	72	92	17	76	76	76
8	92	100	100	18	56	72	76
9	36	48	52	19	68	44	88
10	44	84	84	20	80	92	100
Average	**63.4**	**77.6**	**87.6**				

It can be seen in Table I, the average in Test 1, conducted by 20 students, is 63.4, and the average in Test 2 is 77.6. The average in Test 2 is an increase of 14.2 points from the average in Test 1. The average in Test 3 is 87.6. There is an increase of 10 points from the average of Test 2. Fig. 12 depicts the comparison graph of scores from the 3 test attempts conducted by 20 respondents.
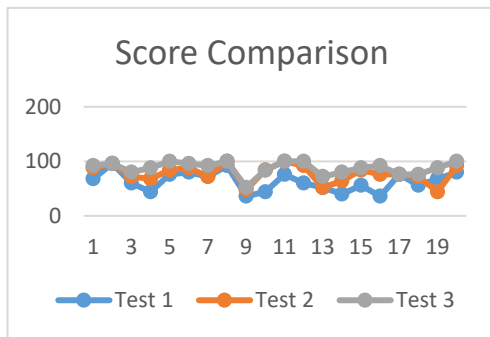

Fig. 12. Score comparison chart.

In the graph, the lowest score in the first exam was 30 points, and the highest score was 96 points. On the 2nd exam, the lowest score was 44, and the highest score was 100. On the 3rd exam, the lowest score was 52, and the highest score was 100. It can be concluded that there was an increase in the first, second, and third Reading test scores for 20 students.
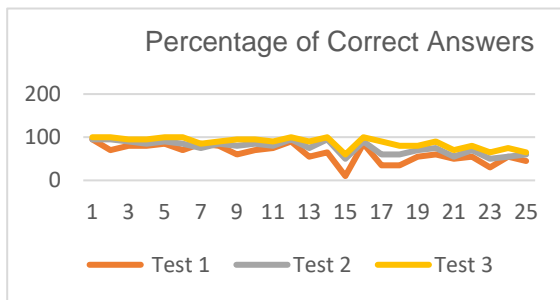

Fig. 13. Correct answer percentage graph.

Fig. 13 illustrates the graph of correct answers given by 20 respondents across the 3 test attempts. In the graph, the percentage of correct answers in the first reading test, the lowest is in question number 15, and the highest

percentage is in number 1. In the second test, the lowest percentage of correct answers is in number 15, and the highest percentage of correct answers is in numbers 1, 2, 12, and 14. In the third exam, the lowest percentage of test scores is located at number 15, and the highest percentage of correct answers is located at numbers 1, 2, 5, 6, 12, 14, and 16. From the graph, it can be concluded that the percentage of correct answers on the first, second, and third reading exams always increase.

Table II will present the percentage results for the question numbers where many students answered correctly.

TABLE II.   RESPONDENT'S CORRECT ANSWER

Question number	Number of Correct Questions Test 1	Percent Correct Test 1	Number of Correct Questions Test 2	Percent Correct Test 2	Number of Correct Questions Test 3	Percent Correct Test 3
1	19	95%	19	95%	20	100%
2	14	70%	19	95%	20	100%
3	16	80%	18	90%	19	95%
4	16	80%	17	85%	19	95%
5	17	85%	18	90%	20	100%
6	14	70%	17	85%	20	100%
7	17	85%	15	75%	17	85%
8	16	80%	17	85%	18	90%
9	12	60%	16	80%	19	95%
10	14	70%	17	85%	19	95%
11	15	75%	16	80%	18	90%
12	18	90%	19	95%	20	100%
13	11	55%	15	75%	18	90%
14	13	65%	19	95%	20	100%
15	2	10%	10	50%	12	60%
16	17	85%	18	90%	20	100%
17	7	35%	12	60%	18	90%
18	7	35%	12	60%	16	80%
19	11	55%	14	70%	16	80%
20	12	60%	15	75%	18	90%
21	10	50%	11	55%	14	70%
22	11	55%	14	70%	16	80%
23	6	30%	10	50%	13	65%
24	11	55%	11	55%	15	75%
25	9	45%	12	60%	13	65%

In the table of the percentage of correct answers for the 25 question numbers, it can be seen in the first reading test that the lowest percentage of correct answers is located at number 15, where there are only two respondents who answered correctly (10%) and the highest percentage of answers is located at number 1 where there are 21 respondents who answered correctly (95%).

In the second test, the lowest percentage of correct was still at number 15, but there was an increase. There were ten respondents who answered correctly (50%), and the highest percentage of correct answers was on numbers 1, 2, 12, and 14, where there were 19 respondents who answered correctly (95%). In the second reading test, there was an increase in the number of questions with the highest percentage of correct answers.

In the first reading test, there was only 1 question number which was the highest percentage of answers. In the second reading test, there were 4 question numbers which were the highest percentage of answers. In the third test, the lowest percentage of correct answers was still at number 15, but when compared to the first and second reading exams, there was an increase. In number 15 in the

3rd test, 12 respondents answered correctly (65%). The highest percentage of correct answers in the third reading test lies in numbers 1, 2, 5, 6, 12, 14, and 16, where all respondents answered correctly (100%). The highest percentage of correct answers on the third exam, when compared to the highest percentage of correct answers on the second exam, also experienced an increase. In the highest percentage of correct answers in the second reading test, there were only 4 question numbers with a percentage of 95%. In the third reading test, there were 7 question numbers which all respondents (100%) answered correctly.

In the first, second, and third exams, the most errors were found in question number 15. As seen in Fig. 14, it shows the image of question number 15, which is the question where students most frequently provided incorrect answers.

Fig. 14. The lowest percentage of correct answers page.

Number 15 is a type of question about interpreting pictures, where respondents are asked to choose the right picture based on the questions given, but the choice of pictures given in it contains Chinese writing, which is difficult for respondents to understand when working on the questions.

In Table III, it is explained that for question 15, the percentage of respondents who chose multiple-choice options A, B, and C can be observed.

TABLE III. RESPONDENT'S ANSWERS TO QUESTION No. 15

Test	Answer Options	Number of Respondents	Percentage
Test 1	A	18	90
	B (Correct Answer)	**2**	**10**
	C	0	0
Test 2	A	8	40
	B (Correct Answer)	**10**	**50**
	C	2	10
Test 3	A	8	40
	B (Correct Answer)	**12**	**60**
	C	0	0

In the table, the percentage of correct answers to question number 15 has increased, namely from the first test to the second test, there was an increase of 40%, and from the second test to the third test, there was an increase of 20%.

In the first, second, and third exams, the highest percentage of correct answers is in question number 1. In Fig. 15, it is an illustration of question number 1.
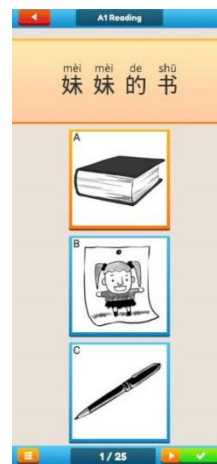

Fig. 15. The highest percentage of correct answers page.

Picture from question number 1. Question number 1 is a type of question about interpreting pictures, where respondents are asked to choose the right picture based on the question given. The pictures look simple and easy, so they are easily mastered by the respondents.

In Table III, it contains the percentages of students who answered question number 1 for options A, B, and C.

TABLE IV. RESPONDENT'S ANSWERS TO QUESTION No. 1

Test	Answer Options	Number of Respondents	Percentage
Test 1	**A (Correct Answer)**	**19**	**95**
	B	1	5
	C	0	0
Test 2	**A (Correct Answer)**	**19**	**95**
	B	1	5
	C	0	0
Test 3	**A (Correct Answer)**	**20**	**100**
	B	0	0
	C	0	0

In the table, the percentage of correct answers in the first test was 95%, and in the second test, it was 95%, which means constant. The percentage of correct answers to the third test is 100%, which means there is an increase of 5% from the first and second tests.

V. CONCLUSION

Based on the results of research conducted on 20 respondents, it can be concluded that for each reading test given, the respondents experienced an increase in scores. In the second reading test, there was an increase of 14.2 points from the average score of the first reading test, and in the third reading test, there was an increase of 10 points from the average value of the second reading test. In the lowest percentage of correct answers found in question number 15, there was an increase of 40% on the second test and an increase of 20% on the third test. The highest percentage of correct answers was in question number 1. There was an increase of 5% from the first and second tests. In essence, these findings highlight progressive performance

enhancement in Reading tests. The research underscores the effectiveness of the learning approach, showing evidence of successful mastery for specific question types. This study emphasizes tailored approaches and effective methodologies as crucial factors for consistent progress in language learning outcomes. This shows that the TOCFL reading mobile application influences improving the reading ability of Chinese language learners.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Vincentius Valiandy Jiuangga led the research, conducted literature review, assisted in data analysis, and contributed to writing the research findings; Mei Rianto Chandra analyzed data and assisted in article writing; Yi Ying assisted in conceptualizing the research methodology; Agatha Angelina assisted in collecting research samples and gathering research data; all authors had approved the final version.

ACKNOWLEDGMENT

REFERENCES

[1] F. Mkize and F. Chisoni, "The role of motivation in learning Chinese as a second language: A case STUDY of Zimbabwean students learning Chinese as a second language," *International Journal of Language and Linguistics*, vol. 3, pp. 252–257, 2015.

[2] K. Rosalin, Y. Ying, and V. M. Aryanti, "Using web-based games to improve Mandarin vocabulary learning," in *Proc. IEEE 7th International Conference on Computing, Engineering, and Design (ICCED)*, 2021.

[3] T. Listyorini and R. Rahim, "A prototype fire detection implemented using the internet of things and fuzzy logic," *World Trans. Eng. Technol. Educ.*, vol. 16, pp. 42–46, 2018.

[4] S. Setuju, B. R. Setiadi, D. Ratnawati, *et al.*, "Development e-learning to improve student activity with technological pedagogical and content knowledge," *International Journal of Engineering & Technology*, vol. 7, pp. 100–103, 2018.

[5] A. Haleem, M. Javaid, M. A. Qadri, and R. Suman, "Understanding the role of digital technologies in education: A review," *Sustainable Operations and Computers*, vol. 3, pp. 275–285, 2022.

[6] Y. D. Puspitarini and M. Hanif, "Using learning media to increase learning motivation in elementary school," *Anatolian Journal of Education*, vol. 4, pp. 53–60, 2019.

[7] Y. Hari, D. Aspali, and B. Hermawan, "Interpretation of e-learning as a media support for learning Mandarin for elementary school students," *Journal of Informatics*, vol. 12, pp. 77–83, 2014.

[8] M. D. Abdulrahaman, N. Faruk, A. A. Oloyede, *et al.*, "Multimedia tools in the teaching and learning processes: A systematic review," *Heliyon*, vol. 6, pp. 1–14, 2020.

[9] C. H. Ya, "Mobile assisted language learning apps for the Chinese classroom," *Journal of Technology and Chinese Language Teaching*, vol. 7, pp. 113–119, 2016.

[10] A. S. Wibowo, "The use of the pleco Chinese dictionary app in Chinese language learning in Sekolah Tinggi Bahasa Harapan Bersama," *Journal of Physics: Conference Series*, vol. 1477, 2020.

[11] R. Gangaianmaran and M. Pasupathi, "Review on use of mobile apps for language learning," *International Journal of Applied Engineering Research*, vol. 12, pp. 11242–11251, 2017.

[12] X. Chen, "Evaluating language-learning mobile apps for second-language learners," *Journal of Educational Technology Development and Exchange*, vol. 9, pp. 39–51, 2016.

[13] K. N. Chee, N. Yahaya, and N. H. Ibrahim, "Factors of students' performance based on cognitive level in a mobile learning environment," *International Journal Mobile Learning and Organization*, vol. 12, pp. 190–212, January 2018.

[14] L. Thamrin, R. Marlina, and Y. Yokhebed, "Reading ability analysis of Mandarin language in Pontianak Junior High School VIII grade students," *Advances in Social Science, Education and Humanities Research*, vol. 166, pp. 169–172, 2018.

[15] S. Zhang, "An evidence based guide to designing and developing Chinese-as-a-Foreign Language (CFL) courses online," *International Journal of Technology in Teaching and Learning*, vol. 10, pp. 52–71, 2014.

[16] Jureynolds, Theresia, and Y. Ying, "Benefits of using mobile apps as a support for Mandarin language learning," *Journal of Physics: Conference Series*, vol. 1764, 2021.

[17] H. L. Ngoc and X. T. Khai, "Active mobile Chinese, a new approach in learning Chinese as a foreign language," in *Proc. ICERI2019*, November 2019. doi: 10.21125/iceri.2019.0770

[18] Y. T. Lin, C. H. Kao, and Y. J. Lan, "The effects of mobile learning on students' oral performance in Mandarin Chinese and their attitudes," *International Journal Mobile Learning and Organization*, vol. 10, pp. 78–101, 2016.

[19] H. U. Zengning, "Vocabulary learning assisted by mobile phones: Perceptions of Chinese adult learners," *Journal of Cambridge Studies*, vol. 8, pp. 139–154, 2011.