[1] **Nor Sanak Mohd Nabil**
[2] **Hasniza Nordin**
[3] **Faizahani Ab Rahman**

Leveraging Augmented Reality (AR) Filters to Enhance Speaking Fluency in Distance Teaching and Learning: A TUP Framework Evaluation

Journal of Electrical Systems

Abstract: - This study explores Augmented Reality (AR) filters utilization by English as a Second Language (ESL) teachers to improve speaking fluency teaching in distance learning environments, particularly in informal, out-of-school contexts. Since distance and flexible learning accelerated after the COVID-19 outbreak, using AR as a mobile technology is prevalent in language teaching and learning. Numerous studies have highlighted that AR provides innovative solutions for enhancing student engagement and oral language proficiency in language instruction. This research employed the Technology Usability Pedagogy (TUP) model to evaluate the AR filters for ESL speaking fluency teaching through the technological functionality, ease of use, and pedagogical effectiveness. Qualitative research method was employed in this study. Data were collected from ESL teachers interviews and teaching artefacts and the data revealed that AR filters provided platform for distance speaking tasks, allowed for personal feedback, and created simulated environment in informal setting making them particularly effective for developing fluency outside traditional classroom. This study highlights how AR filters are generally user-friendly for teachers, while also offering pedagogically rigorous approaches to speaking fluency. Nevertheless, the participants asserted challenges such as limited access to network in distance teaching context and digital literacy for teachers in under-resourced areas. Despite these limitations, findings suggest that AR filters can significantly improve distance teaching of speaking fluency by enhancing student engagement and facilitating continuous speaking fluency instruction beyond formal classroom setting. This study contributes to growing body of research on augmented reality in language instruction, specifically within the ESL environment, and offers practical suggestions for future studies in language education and acquisition.

Keywords: AR filters, Distance Teaching and Learning, ESL teaching, Speaking Fluency, TUP Framework.

I. INTRODUCTION

The advancement of technology assists language teachers teaching to be conducted not only inside the classroom but also outside the confined four classroom walls. Additionally, this situation was further accelerated by the passing of Covid-19. During the Covid-19 pandemic, distance teaching and learning were implemented, compelling teachers to teach and students to learn from where they resided. These distance teaching and learning activities were designed according to the demands of instructors as well as pupils.

Similar to language teaching and learning, particularly for English as A Second Language (ESL), teachers and students need to quickly adapt to the fast-changing world that requires distance ESL lessons. Nevertheless, in teaching speaking skills, various restrictions were highlighted by teachers and students [1], [2]. Among them were vocabulary, pronunciation and limited technology utilization. Teaching speaking fluency in distance learning requires support from technology to help and assist the teaching and learning. Thus, an immersive setting is helpful for teachers to teach students a particular topic since the teaching and learning process will be done outside the classroom context, in the comfort of their own home.

Therefore, based on the issue mentioned, it is important to leverage immersive technology which includes virtual reality (VR) and augmented reality (AR) which can help in language teaching and learning as mentioned by numerous studies [3], [4]. In the current study, AR is selected to be explored further since it is easily available through mobile devices and provides cheaper options for teaching and learning [5], [6] AR technology was found to help in language learning and this includes first, second or foreign language learning [7], [8] and it is believed that this technology has great potential to improve speaking fluency teaching among secondary school ESL teachers. Since limited studies were previously conducted on AR filters in distance teaching and learning of speaking fluency in the ESL context, thus the study needs to be conducted**.**

[1] School of Education, University Utara Malaysia. sanak.nabil@gmail.com
[2] Institute of Excellent Teachers and Leaders in Education (IETLE), University Utara Malaysia (UUM). nizadin@uum.edu.my
[3] School of Education, University Utara Malaysia. faizahani@uum.edu.my

II. LITERATURE REVIEW

The application of Augmented Reality (AR) filters to enhance speaking fluency in distance teaching and learning environments has gained significant attention. AR enables learners to interact with virtual environments, improving language acquisition by providing real-time feedback and interactive experiences. According to [9], AR allows the creation of immersive language learning environments that foster engagement and simulate real-world communication situations. These technologies not only provide context-rich learning but also help lower the affective filter, which is critical in language acquisition [10] reducing learner anxiety and offering dynamic interaction, AR facilitates greater practice opportunities for learners, making speaking fluency achievable in remote learning settings.

The Technology, Usability, Pedagogy (TUP) framework, which focuses on the specific ways in which learners interact with and use technology for educational purposes [11], is highly applicable when evaluating AR integration in distance language teaching and learning. The framework emphasizes how technological tools are utilized based on needs and contexts. In the case of AR filters evaluation, these filters can be aligned with the TUP categories on technology, usability and pedagogy. AR filters enable language learners to actively produce spoken content in interactive sessions while receiving real-time feedback. This aspect aligns with TUP's emphasis on tools that facilitate knowledge creation rather than mere content consumption, making AR a potent tool for increasing learner engagement and improving speaking fluency.

Several studies have highlighted the effectiveness of AR in enhancing speaking skills [12], [13]. For example, [13] conducted a meta-analysis showing that AR applications are particularly effective in promoting language fluency by simulating authentic communication scenarios, thereby providing immediate and context-based feedback. This ability to simulate real-life interactions through AR filters is crucial in distance learning environments, where students may lack direct communication opportunities. Moreover, AR's interactive capabilities, such as voice recognition, make it easier to correct pronunciation and syntax in real-time, thus aiding in the rapid development of speaking proficiency [14].

In conclusion, the integration of AR filters, evaluated through the TUP framework, represents a significant advancement in the field of language learning, especially for developing ESL speaking fluency teaching in distance education. By utilizing AR filters, educators can address the challenges of remote learning, particularly the lack of immediate interaction and feedback. This technology provides learners with immersive, interactive environments that encourage active participation and real-time communication. As AR continues to evolve, its applications in language learning will likely expand, offering educators new ways to support student engagement and speaking fluency in distance teaching and learning settings.

III. METHODOLOGY

3.1 Research Design

The research design for this study employs a qualitative approach, specifically utilizing semi-structured interviews to explore the subjective experiences of ESL teachers on the use of AR filters to enhance speaking fluency in distance teaching and learning.

Qualitative research is particularly well-suited for understanding complex phenomena in educational contexts, where participants' experiences and perceptions provide rich data that cannot be captured through quantitative methods alone [15] Semi-structured interviews allow for flexibility, enabling participants to express their views in-depth while still ensuring that key topics related to AR usage and the TUP framework are covered [16].

3.2 Participants

Purposive sampling was employed to select participants who experienced the AR filters technology in educational settings, ensuring that the participants consisted of individuals with relevant insights [17]. Interview questions focused on participants' experiences with AR filters, their perceptions of its benefits and challenges and how these tools impact speaking fluency teaching in distance learning contexts. Data from the interviews were transcribed and analyzed using thematic analysis, a widely used method in qualitative research for identifying patterns and themes within the data [18]. This approach is suitable for capturing the nuanced ways in which AR filters contribute to language learning, especially in terms of enhancing speaking fluency in virtual environments in distance learning and teaching.

3.3 Instruments

The instrument utilized in this study is the semi-structured interview protocol. Semi-structured interviews are a fundamental qualitative research tool, particularly well-suited for exploring participants' evaluations of AR filters in educational settings. This method combines the flexibility of open-ended questions with the direction of more structured interviews, allowing researchers to delve into complex experiences while ensuring that specific topics, such as the use and impact of AR filters, are consistently addressed across interviews. This balance enables researchers to gather rich, detailed data while maintaining focus on the study's aims. Semi-structured interviews are particularly effective for evaluating AR filters because they allow participants to express their thoughts on the technology's usability, effectiveness, and educational impact in their own words, providing insights that are both deep and broad. Researchers can explore nuances such as how users perceive the integration of AR into learning environments and the specific ways these technological tools meet their educational needs or fall short. The flexibility of this method also allows researchers to adapt their questions based on respondents' answers, probing deeper into important areas that emerge during the conversation. Consequently, the data collected through semi-structured interviews can be instrumental in uncovering detailed user experiences and evaluations, making it an indispensable method for assessing the effectiveness and reception of AR filters in educational research.

3.4 Data Analysis

Thematic analysis, as outlined by [19] was utilized in analyzing the interview data. This method of analysis is particularly suited for identifying patterns and themes in qualitative data and allows the researcher to explore how AR filters influence speaking fluency in distance learning. The six-phase approach to thematic analysis will guide the process, from familiarization with the data to generating, reviewing, and defining themes that reflect the participants' experiences [18]. This approach will provide a nuanced understanding of how AR filters can be leveraged to support language acquisition in remote learning environments.

3.5 Trustworthiness

In qualitative research, it is important to ensure trustworthiness which encompasses criteria such as credibility, dependability, confirmability, and transferability [20]. In this study, to maintain the precision and credibility of the findings multiple strategies were employed which include member checking and the involvement of critical friend groups. These techniques serve to minimize researchers' bias, enhance the data accuracy and interpretation, and provide a well-rounded understanding of the phenomena under investigation. By employing these approaches, the research findings become more robust, grounded, and reflective of the participants' genuine experiences.

Member checking is used to enhance the credibility of qualitative research by allowing participants to review and confirm the accuracy of the data collected and the interpretations drawn from it. In this study, after the initial analysis of the interview data, transcripts and preliminary themes were shared with participants for their feedback. This process helped verify that the interpretations accurately reflected their views and experiences as utilized in [21]. By providing participants the opportunity to confirm or clarify the data, member checking ensures that the researcher does not misinterpret or distort the participants' intended meanings.

The involvement of a critical friend group also ensures trustworthiness by providing external perspectives throughout the research process. In this study, the critical friends involved colleagues and peers who offered constructive criticism, challenged assumptions, and provided an objective viewpoint on the research design, data collection, and analysis. They were engaged to review the coding process and the emerging themes, offering feedback that helped refine the analysis to enable the researchers to critically reflect on their own biases and assumptions.

IV. Result And Discussion

The integration of AR filters into language learning, particularly for enhancing speaking fluency in distance education, has shown significant potential in addressing traditional limitations of remote learning. Six participants were involved in this study. Their profile can be seen in the following Table I.

Table 1: Participants' Profile

Participants	Qualification	Experience
Teacher A	TESL Degree in local university	24 years
Teacher B	TESL Degree in oversea university	21 years
Teacher C	TESL Degree in local university	10 years

Participants	Qualification	Experience
Teacher D	Master of ELT in local university	7 years
Teacher E	Master of ELT in local university	12 years
Teacher F	TESL Degree in oversea university	9 years

*The data of the participants were collected by the authors.

As seen in Table 1, all participants have more than 5 years of teaching experience and they have a degree or master's degree in English Language Teaching (ELT) or Teaching English as A Second Language (TESL). Based on their responses from the interview, the result of this study was obtained.

In this study, the interview from the participants managed to explore three key themes: (1) AR filters provide platform for distance speaking tasks, (2) AR filters allow personalized feedback, and (3) AR filters create simulated environments for informal speaking practice. These themes were derived from qualitative data collected through interviews with educators who have employed AR filters technology in their online and distance teaching. The following Fig. 1 highlights the themes that emerged from the data and the discussions further mention how these aspects of AR filters technology contribute to speaking fluency teaching, especially in fostering speaking fluency in distance teaching and learning contexts.

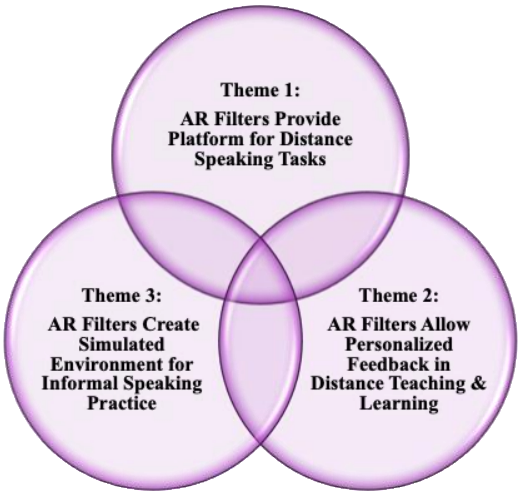

Fig 1. The themes emerged from the research data

4.1 Theme 1- AR Filters Provide Platform for Distance Speaking Tasks

Participants frequently highlighted the effectiveness of AR filters in creating structured platforms for speaking tasks in distance learning. For example, the participants such as Teacher E and Teacher F emphasized that by using AR, teachers can teach students outside the classroom while students can do the speaking task that can improve their fluency even when they are about to sleep at home. This evidence shows that AR usage can provide flexibility to do the task which is also supported by recent literature. For example, a study suggests that AR technologies enhance motivation and participation in remote learning contexts by offering more interactive tasks [22]

From their responses, it is clear that AR technology allows learners to engage in virtual speaking exercises despite geographical distances, creating opportunities for active language use that would otherwise be limited in traditional remote settings. Recent studies emphasize that AR's ability to simulate real-time conversations with virtual avatars or objects enhances speaking performance by providing consistent and accessible practice ([9], [14] These virtual platforms foster a sense of presence and engagement, mitigating the lack of direct human interaction in distance learning. As learners can access these speaking tasks at their convenience, AR filters make language learning more flexible and adaptable, increasing the opportunity for practice [23].

Although the data in the current study did not include the role of learners in the evaluation of the AR filters since the focus was on ESL teachers' evaluation, it was found that the ability to assign speaking tasks using AR filters allows educators to design activities that encourage active language production, a critical factor in improving speaking fluency. Among the activities mentioned by the participants was role-play. The participants who were ESL teachers highlighted that their students felt more confident to speak when conducting role play using the AR filters as the students could feel as if they were inside the 'real setting' so they get to speak better. This is aligned with research where the learners in the study [14] reported that the AR-based tasks gave them more confidence to practice speaking, as the immersive interface reduced the anxiety typically associated with speaking in front of

peers or instructors [14]. Therefore, it can be clearly said that AR filters could provide a platform for speaking tasks in informal or distance teaching and learning sessions.

4.2 Theme 2- AR Filters Allow Personalized Feedback in Distance Teaching and Learning

Another significant finding was the role of AR filters in assisting the process of delivering personalized feedback to learners, which can help them improve their speaking fluency. Participants noted that AR filters allow them to give feedback on their students' work through online platforms such as Instagram or in TikTok. For example, Teacher B and Teacher C highlighted that:

"I can give feedback to my students based on what they said, from anywhere, so easy"- Teacher B

"You know our time is limited inside [the] classroom, so even outside school time and school hours, I can still comment on their speaking skill" -Teacher C

Based on the responses given by Teacher B and Teacher C, they highlighted a significant way in which feedback can be delivered in ESL teaching, particularly with the use of technology in distance educational settings. Their statements reflected that AR filters have the potential to provide personalized feedback to be more efficient, flexible, and responsive to cater to individual student needs, even beyond the traditional classroom boundaries. For instance, Teacher B's assertion demonstrated the convenience of delivering feedback from any location, reflecting the prevalence of AR filters in contemporary education particularly in online or in distance teaching and learning. This statement although simple, reflected that AR filters technology enables asynchronous communication between educators and learners, promoting more prompt and ongoing interaction. This capacity to offer feedback from any location allows educators to broaden the learning experience beyond the temporal and spatial limitations of the classroom. This flexibility improves the feedback process and enables higher customization, allowing teachers to offer context-specific and focused guidance that closely corresponds with each student's performance.

Pertaining to what Teacher B and Teacher C mentioned, this aligned with recent literature suggesting that personalized feedback can be provided by teachers through AR which can foster rapid improvement by addressing each learner's specific weaknesses [13]. For instance, ESL teachers can detect mispronunciations or hesitations and provide corrective feedback instantly, allowing learners to self-correct and practice until they reach the desired proficiency. This feedback loop is especially valuable in distance education, where immediate corrective feedback from a human instructor might not always be feasible. Personalized AR feedback enhances learner autonomy, giving them control over their learning pace and focus areas. Hence, the finding of this study is also aligned with [24] who mentioned that AR could facilitate personalized learning.

However, while the ease of providing feedback from anywhere is advantageous, it raises concerns about the increased expectations of teachers' availability. With technology enabling feedback at any time, the risk is that teachers may feel pressure to be constantly accessible, blurring the boundaries between work and personal time [25]. While personalized feedback becomes more feasible through the integration of AR filters in language teaching, specifically in speaking fluency teaching, it must be balanced against teacher well-being and workload for teachers and students to have balance in work and personal life.

Therefore, the responses of Teacher B and Teacher C emphasized the transformative potential of AR filters technology in delivering personalized feedback. It enables teachers to provide timely, context-specific, and continuous guidance, which is essential for enhancing student learning outcomes. However, this flexibility also presents challenges related to teacher workload and digital equity. As such, while personalized feedback facilitated by technology can greatly benefit students, it must be implemented thoughtfully and equitably, with consideration for both teacher well-being and student access.

4.3 Theme 3- AR Filters Create Simulated Environment for Informal Speaking Practice

A major advantage of AR filters is their ability of the technology to create informal, low-pressure environments for speaking practice. Unlike traditional classroom settings, which may induce anxiety in learners, AR-based environments allow for practice in simulated, contexts that mimic real-world scenarios without the high-stakes pressure of direct human interaction or without teachers needing to do the 3D model for the setting. This evidence is seen in how teachers perceive and use the technology. Teacher A for example stated that by providing immersive environments that mimic real-life scenarios, AR filters enable her learners to practice and reinforce language structures repetitively and contextually through the structured repetition, using the vocabulary in the AR filter.

A study mentioned that this frequent, contextualized practice facilitates the internalization of speech patterns, thereby accelerating the transition from conscious language processing to automatic speech production [26]. So, even though learners are not learning inside the classroom, they are still able to practice speaking fluency by using AR filters.

According to [27] informal learning environments supported by AR tools help learners engage in natural language use, which is critical for the development of language. The ability to practice speaking in simulated environments, such as through role-play with virtual characters, fosters confidence and encourages experimentation with language. This aligns with [10] affective filter hypothesis, which posits that low-anxiety environments are essential for effective language acquisition. AR filters create a space where learners can practice without fear of making mistakes, ultimately promoting fluency and comfort with language use.

The findings of this study illustrated the valuable role that AR filters play in enhancing speaking fluency in distance learning. Teacher D and Teacher C disclosed that the AR filters can be used as a platform before using other filters available on online platforms or developed by teachers or developers. For example, Teacher D mentioned that his students can use the AR filter developed by the researcher first before they can find other topics to be conducted with other AR filters available online, so they can use it as a springboard. He also added that the AR filter can be used as a springboard for various topics. Therefore, by providing platforms for structured speaking tasks, delivering personalized feedback, and creating simulated environments for informal practice, AR filter technology offers significant pedagogical benefits in distance language education. These results are consistent with current research, which underscores the potential of AR to transform language learning by making it more interactive, personalized, and accessible [9] [13].

Nevertheless, despite the benefits, the participants also said that the application of AR might also include a few disadvantages that need consideration. One key concern is the implementation of AR filters requires smartphones, tablets, or special AR headsets. Although almost all students have smartphones and tablets available in secondary schools, they may be inaccessible to all learners, especially in under-resourced areas or institutions [28]. For example, Teacher C stressed that although his school supplied tablet computers with internet access for pupils during online teaching sessions, some students were unable to participate owing to network problems, including poor and unreliable connections. This may result in inequities in access to educational opportunities, so constraining the inclusion of AR-based educational interventions. A further constraint is the possibility of technical difficulties that teachers are afraid they might face later. These include software glitches, incompatible hardware and the most common problem in distance learning which is internet connectivity issues, which can hinder the learning experience and cause dissatisfaction for both learners and teachers [29].

Moreover, teachers also mentioned their concern that the novelty of AR filters might occasionally divert learners' attention from the essential material, since the emphasis may transition towards the technology rather than the educational goals. This much dependence on technology may undermine significant learning unless it is meticulously included in the curriculum with explicit pedagogical objectives. Hence, to include AR filters in distance teaching and learning, all the challenges mentioned need to be overcome so that the technology can be balanced with the aim of the lesson.

V. CONCLUSION

In conclusion, from the present study, it was found that AR filters can assist language teachers, particularly ESL teachers when teaching speaking fluency in distance and online teaching and learning contexts. The three themes that emerged that are related to distance utilization of AR filters for speaking fluency teaching include AR filters can create a simulated environment for informal speaking practice (Technology), can allow personalized feedback in distance (Usability) and can provide platform for distance speaking tasks (Pedagogy). Nonetheless, even though these AR filters might benefit ESL teachers in various ways, their utilization in distance teaching and learning should be carefully done and integrated to maintain teachers' professional teaching and boundaries in the informal teaching context.

Future research should continue to explore how AR filter technology can be further integrated into distance teaching and learning of language using the TUP framework or other frameworks to optimize speaking fluency teaching and other aspects of language acquisition. This work is important for the development of distance teaching in the ESL context especially when teaching language skills such as speaking.

VI. ACKNOWLEDGEMENT

The authors would like to thank the participants who were willing to participate, contribute and cooperate in the process of conducting this study.

REFERENCES

[1] K. Ahmed, "Pedagogy in Speaking: Challenges Addressed by Teacher-Student in the ESL Context," International Journal of Applied Linguistics and English Literature, vol. 7, no. 3, p. 97, 2018, doi: 10.7575/aiac.ijalel.v.7n.3p.97.

[2] S. Kashinathan and A. A. Azlina, “ESL Learners ’ Challenges in Speaking English in Malaysian Classroom,” International Journal of Academic Research in Progressive Education and Development, vol. 1, no. 2, pp. 983–991, 2021, doi: 10.6007/IJARPED/v10-i2/10355.

[3] X. Huang, D. Zou, G. Cheng, and H. Xie, “A systematic review of AR and VR enhanced language learning,” Sustainability (Switzerland), vol. 13, no. 9, May 2021, doi: 10.3390/su13094639.

[4] M. Homen Pavlin and M. Sužnjevic, “The opinions and attitudes of students future IT teachers on the use of VR and AR in teaching,” in 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics, MIPRO 2019, K. M., B. Z., S. K., C. Z., C.-S. M., B. S., S. V., S. D., R. S., G. S., V. B., M. M., T. E., P. P., H. D., G. T.G., and J. M., Eds., Faculty of Teacher Education, University of Zagreb, Zagreb, Croatia: Institute of Electrical and Electronics Engineers Inc., 2019, pp. 709–714. doi: 10.23919/MIPRO.2019.08757001.

[5] R. Shadiev and Q. Liang, “A review of research on AR-supported language learning,” Innovation in Language Learning and Teaching, vol. 18, no. 1, pp. 78–100, 2024, doi: 10.1080/17501229.2023.2229804.

[6] N. Eang and J. Na-Songkhla, “The Framework of an AR-Quest Instructional Design Model Based on Situated Learning to Enhance Thai Undergraduate Students’ Khmer Vocabulary Ability,” 2020.

[7] J. Leong, F. Perteneder, M. R. Rajvee, and P. Maes, “‘Picture the Audience...’: Exploring Private AR Face Filters for Online Public Speaking,” Conference on Human Factors in Computing Systems - Proceedings, 2023, doi: 10.1145/3544548.3581039.

[8] K. C. Hsu and G. Z. Liu, “Investigating effects and learners’ perceptions of a student-led, AR-based learning design for developing students’ English speaking proficiency,” International Journal of Mobile Learning and Organisation, vol. 15, no. 3, 2021, doi: 10.1504/IJMLO.2021.116519.

[9] R. Godwin-Jones, “Augmented reality and language learning: From annotated vocabulary to place-based mobile games,” Language Learning and Technology, vol. 20, no. 3, pp. 9–19, 2016.

[10] S. D. Krashen, Principles and Practice in Second Language Acquisition. University of Southern California, 1985.

[11] R. Bednarik, P. Gerdt, R. Miraftabi, and M. Tukiainen, “Development of the TUP model - Evaluating educational software,” Proceedings - IEEE International Conference on Advanced Learning Technologies, ICALT 2004, pp. 699–701, 2004, doi: 10.1109/ICALT.2004.1357627.

[12] N. S. Mohd Nabil, H. Nordin, and F. Ab Rahman, “Immersive language learning: evaluating augmented reality filter for ESL speaking fluency teaching,” Journal of Research in Innovative Teaching & Learning, Jun. 2024, doi: 10.1108/JRIT-04-2024-0111.

[13] P. Yang and W. Zhang, “Effectiveness of augmented reality on EFL learner’s language gains: a meta-analysis,” Innovation in Language Learning and Teaching, pp. 1–16, Mar. 2024, doi: 10.1080/17501229.2024.2323529.

[14] Y. Jiao, D. DeWitt, and R. Abdul Razak, “Exploring the Potential of Metaverse-Based Platforms for Enhancing English as a Foreign Language (EFL) Learning: A Comprehensive Systematic Review,” International Journal of Information and Education Technology, vol. 14, no. 2, pp. 231–239, 2024, doi: 10.18178/ijiet.2024.14.2.2044.

[15] J. W. Creswell and D. J. Creswell, Research Design (5th Edition). 2018.

[16] S. Kvale and S. Brinkmann, Interviews: Learning the Craft of Qualitative Research Interviewing, Second Edi. London: SAGE Publications, 2009.

[17] M. Q. Patton, “Enhancing the Quality and Credibility of Qualitative Analysis,” Health Serv Res, vol. 34, no. 5 Pt 2, pp. 1189–208, 1999, [Online]. Available: http://www.ncbi.nlm.nih.gov/pubmed/10591279%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC1089059

[18] V. Braun and V. Clarke, Thematic Analysis: A Practical Guide to Understanding and Doing. 2021.

[19] V. Clarke and V. Braun, Thematic analysis: A practical guide. 2021.

[20] N. K. Denzin and Y. S. Lincoln, The SAGE Handbook of Qualitative Research, 5th ed. California: SAGE Publications, 2018. doi: 10.1007/s11229-017-1319-x.

[21] A. Tajuddin, “Exploring The Pre-Service Teachers’ Oral Presentation Anxiety And Self-Efficacy Practice Through Self-Reflection,” 2022.

[22] M. Fan and A. N. Antle, “An English language learning study with rural Chinese children using an augmented reality app,” in 2020 Interaction Design and Children Conference, IDC 2020, School of Animation and Digital Arts Communication, University of China, No.1 Dingfuzhuang East Street, Beijing, 100024, China: Association for Computing Machinery, Inc, 2020, pp. 385–397. doi: 10.1145/3392063.3394409.

[23] M. Attar and V. Yousefi, “Does Integrating Augmented Reality App into Task-based Reading Instruction Pay?,” Research in English Language Pedagogy, pp. 116–139, 2024.

[24] D. Zain, “The Implementation of Augmented Reality for Language Teaching and Learning: A Research Synthesis,” Mextesol Journal, vol. 47, no. 3, pp. 1–15, Jul. 2023, doi: 10.61871/mj.v47n3-3.

[25] N. Y. Ab. Wahab et al., “Impacts of Workload on Teachers’ Well-Being: A Systematic Literature Review,” TEM Journal, pp. 2544–2556, Aug. 2024, doi: 10.18421/TEM133-80.

[26] Li Deng, Dong Yu, and A. Acero, “Structured speech modeling,” IEEE Trans Audio Speech Lang Process, vol. 14, no. 5, pp. 1492–1504, Sep. 2006, doi: 10.1109/TASL.2006.878265.

[27] R. Godwin-Jones, “Future Directions in Informal Language Learning,” 2020.

[28] M. Akçayır and G. Akçayır, “Advantages and challenges associated with augmented reality for education: A systematic review of the literature,” Educ Res Rev, vol. 20, pp. 1–11, Feb. 2017, doi: 10.1016/j.edurev.2016.11.002.

[29] J. Bacca, S. Baldiris, R. Fabregat, S. Graf, and Kinshuk, “Augmented Reality Trends in Education: A Systematic Review of Research and Applications,” J Educ Techno Soc, vol. 17, no. 4, pp. 133–149, 2014, [Online]. Available: http://www.jstor.org/stable/jeductechsoci.17.4.133