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Immersive language learning: evaluating augmented reality filter for ESL speaking fluency teaching

Nor Sanak Mohd Nabil, Hasniza Nordin and Faizahani Ab Rahman
School of Education, Universiti Utara Malaysia, Sintok, Malaysia

Abstract

Purpose – This study aims to explore how the integration of augmented reality (AR) filters into English as a second language (ESL) can enhance speaking fluency teaching. The study sheds light on how AR filter can be best implemented in speaking fluency teaching by the innovative opportunities to transform language learning experiences. In this study, ESL teachers' perceptions and experiences with AR filters in speaking fluency instructions were examined through qualitative research method.

Design/methodology/approach – This study is an evaluation stage study within a bigger study which utilized design and developmental research (DDR) approach. In this third phase of DDR which is the evaluation phase, this study involved semi-structured interviews with six ESL teachers from six different public secondary school settings. Thematic analysis was conducted on the interview transcripts.

Findings – Data analysis revealed several key findings regarding the utilization of AR filters in ESL speaking fluency teaching. Firstly, participants reported that AR filters can be best used in various educational settings. Secondly, AR filters were found to provide supports for various students' levels. Thirdly, participants identified that AR filters can be best used to cater students with diverse learning styles.

Research limitations/implications – The work aims to help ESL educators in using AR filters in their speaking fluency teaching. The limitation of this study is that it includes only the experience of teachers from a public secondary school setting without taking into consideration other secondary institutions such as ESL teachers from private schools or boarding schools. The generalizability of our findings may be affected due to our reliance on self-reported data from a small sample size.

Practical implications – The implications of these findings for ESL pedagogy and teacher professional development are discussed. By incorporating AR filters into ESL speaking fluency instruction, educators can create speaking fluency teaching in various settings such as formal and informal settings. Furthermore, ESL teachers may immerse students in environments that cater to the diverse language learners' styles and language levels through the use of AR filter. Overall, this research contributes to a deeper understanding of the potential of AR filters to transform ESL teaching and learning practices, paving the way for future innovations in language education.

Originality/value – Available studies exploring AR in English teaching exist, but very limited of those utilized markerless AR, in the form of AR filters with speaking fluency teaching. Also, this paper focused on teachers' experience with AR filters in contrast to students' experience in public secondary school settings.

Keywords Augmented reality filter, ESL teachers, Speaking fluency teaching, Public secondary schools

Paper type Research paper

1. Introduction

In the contemporary globalized society, where English is progressively employed as a lingua franca for worldwide discourse, possessing the skill to converse fluently in English is vital for

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achieving scholastic excellence, advancing in one's profession and facilitating cultural interchange. The development of technology and the volatile, uncertain, complex and ambiguous world we are currently living in have an impact on language teaching and learning as well. There are various technologies being implemented in promoting speaking fluency particularly when learning a second language and also foreign language in order to conduct successful language learning. For instance, podcast, video conferencing, recording and virtual reality are among the technologies being inculcated within the area of English language learning (ELL) (Damio and Ibrahim, 2019; Shuib *et al.*, 2020; Yeh *et al.*, 2021). Apart from the abovementioned technologies, a technology that can immerse learners in almost reality-like environment is augmented reality (AR) technology. AR is a technology that can combine virtual objects in the real world where both can simultaneously exist at the same time in one frame (Milgram and Kishino, 1994).

Since the introduction of AR technology 50 years ago (Sommerauer and Müller, 2014), this technology has been adapted in various fields such as military, medical, engineering and also in education (Sirakaya and Cakmak, 2018). Although the adoption of AR in education and language learning and teaching is still considered at its adolescence state (Farah *et al.*, 2022), this technology has found to be great in assisting learners and educators, particularly in language learning. Numerous studies have shown its potential application in language learning. For example, AR books (Cheng, 2017), AR flash cards (Aizan *et al.*, 2019; Tsai, 2018) and AR games (Wu, 2021) have been found to improve English language acquisition (Wedyan *et al.*, 2022), grammar (Wedyan *et al.*, 2022) and also skill such as reading (Mohd Hafizuddin and Abu Bakar, 2019), writing (Koç *et al.*, 2021; Soo *et al.*, 2019) and listening (Ismayatim *et al.*, 2019; Ma, 2022). Nevertheless, most of the aforementioned studies use AR in the form of marker-based and location-based AR and very few studies explore AR in the form of markerless AR which includes AR filters in the teaching of language skills like speaking.

The use of markerless AR like AR filters can assist teachers with English as a second language (ESL) in teaching speaking fluency. This is because various studies have found that traditional approaches to ESL speaking fluency instruction were quite ineffective in improving speaking fluency where teachers were also found to be neglecting speaking fluency teaching in a narrow sense and focus on fluency in a broad sense (Morrison, 2018; Rossiter *et al.*, 2009; Tavakoli and Hunter, 2018). This current situation portrays the need for the introduction of AR filters as an emerging technology in English language teaching (ELT) to promote speaking fluency teaching in a narrow sense which can directly help students to improve their speaking in a second language or foreign language.

The adoption of AR filters as an emerging technology in language education demands knowledge and expertise from educators' part. However, currently educators are found to have limited exposure to AR filters due to a lack of understanding of this technology and its application in real language teaching and learning context. Most studies pertaining AR filters were conducted in business (Javornik *et al.*, 2021; Yim and Park, 2019), makeup try on and other entertainment fields (Phua and Kim, 2018) due to their nature, which is more towards fun and captivating content (Javornik *et al.*, 2022). Among the earliest studies on the application of AR filters in education was that conducted by Soltani and Morice (2020) in sports education and training even though this technology was introduced in 1960 and became known in 1980 (Azuma, 1997). This demands a more extensive study done on the use of AR filters in language teaching and learning, particularly in ELT, so that deeper understanding can be obtained on its application in language teaching and to explore its effectiveness in ESL speaking fluency teaching.

2. Literature review and research gap

2.1 Introduction to ESL speaking fluency instruction

Since fluency comprises both the skill of speaking a language smoothly and effortlessly, as well as the ability to effectively and appropriately express meaning (Ghasemi and Mozaheb, 2021), the teaching of speaking fluency is crucial in English language education as learners need to communicate and participate in English-speaking situations effectively. By prioritizing the development of speaking fluency, language learners acquire the necessary confidence and abilities to actively participate in authentic conversations, articulate their ideas and viewpoints and effectively handle diverse social and professional contexts.

Studies (Bozorgian and Kanani, 2017; Molina and Briesmaster, 2017) mentioned that the training on speaking fluency through task repetition such as via 3/2/1 techniques can promote the growth of speaking skill in the English language. The authors highlighted that for spoken language when learners actively engage in repetition activities, they can directly improve their fluency. Hence, it is crucial to incorporate efficient techniques for teaching speaking fluency in English language education to provide learners with the necessary skills to excel in various linguistic environments.

Nevertheless, traditional teaching approaches have been found to have limitations in developing speaking fluency such as teaching which focuses more on vocabulary or grammar and pronunciation instead of focusing more on developing speaking fluency. Similar to what Tavakoli and Hunter (2018) mentioned, teaching speaking fluency is neglected due to teachers who focus more on free-focus speaking activities, with limited focus being emphasized on fluency-focused activities.

Due to the limitations of traditional teaching approaches, several authors (Hishan, 2020; Sherine *et al.*, 2020; Yeh *et al.*, 2021) have explored the use of technologies to facilitate speaking fluency teaching. For instance, in the study by Yeh *et al.* (2021), the authors stressed the effect of podcast making on the development of students' speaking fluency where after six weeks, students showed improvement in speaking fluency. In addition, the study by Sherine *et al.* (2020) stated that technology such as WhatsApp can help to improve speaking skill beyond formal settings. Another study by Hishan (2020) highlighted that speaking fluency can be improved through task-based language teaching with corrective guidance where his study found that learners with English as a first language improved their automaticity in speaking English.

2.2 Augmented reality technology in language education

The ongoing research on AR for the English language suggests numerous exciting applications and advantages. Researchers have demonstrated that AR can help the process of learning the English language, namely by enhancing vocabulary acquisition (Tsai, 2018) and overall English proficiency (Chang *et al.*, 2020). AR has been discovered to enhance student motivation (Tsai, 2020) and decrease anxiety levels in the process of learning English as a foreign language (Wedyan *et al.*, 2022). Furthermore, the utilization of AR in English learning can enhance reading proficiency (Cheng and Tsai, 2014) and offer a more captivating and interactive educational encounter.

Although past studies have emphasized the potentials and benefits of AR in ELL and ELT, some studies show the challenges AR can bring in education and learning (Alalwan *et al.*, 2020; Alzahrani, 2020; Zahid Iqbal *et al.*, 2022). Some of the challenges mentioned were cognitive overload, teachers' resistance, technical issues and complex and costly technology. Therefore, it is important to utilize AR technology is of low cost, is easily operated and has noncomplex way of operation. This opens up the possibility of markerless AR in the form of AR filters to be incorporated in teaching speaking fluency.

2.3 Research on AR filters for speaking fluency teaching

Existing studies on AR filters in language teaching and learning are limited. Most studies that focused on AR filters were conducted within the field of business and entertainment in social media (Ibáñez-Sánchez *et al.*, 2022; Rios *et al.*, 2018) and the effect of AR filters on users well-being (Javornik *et al.*, 2022). Very minimal studies were conducted on the utilization of AR in language learning (Leong *et al.*, 2023; Zhu *et al.*, 2022). In the study by Zhu *et al.* (2022), AR filters were integrated in L2 pronunciation training in China. This study utilized a mixed-method approach in investigating the effectiveness of utilizing an AR filter application for enhancing the segmental production and articulatory awareness of targeted English consonants (dark/ɬ/,/ð/, and/θ/) among Chinese L2 students. Additionally, the study examined the students' opinions towards this application. The results suggested that the application using AR technology, facial detection technology and digital zoom technology had a beneficial impact on enhancing students' ability to produce individual speech sounds accurately and increasing their awareness of how they articulate these sounds. The interview results also demonstrate that the use of AR filters effectively reduced the learners' anxiety and embarrassment while interacting with the teacher for corrective feedback. Additionally, it fostered daily practice by making the learning experience more enjoyable.

Another more recent study was conducted by Leong *et al.* (2023), in which the authors explore the hidden utilization of AR filters on speakers' and listeners' part to increase speakers' self-confidence in online public speaking by using online surveys. The authors provide key users with an analysis of user perspectives and potential applications of AR filters in the context of online public speaking which include motivation, feeling of comfort and acceptance and when applying AR filters on themselves.

Since there were scarce studies on how AR filters can be best implemented for ESL speaking fluency teaching, there is a need for further research to fill this gap and address the potential of AR technology in ESL education. This is because the current study and its contribution to the field of language education may be vast as it can open up new possibilities for successful integration of markerless AR technology in ELT and ELL.

2.4 Theoretical framework

The current study is grounded in cognitive constructivism theory. Cognitive constructivism asserts that learning is an engaged process in which humans generate information through cognitive processes such as acceptance, accommodation and schema building (Piaget, 1952). In the present study, the application of this theory in teaching and learning provides valuable insights where learners are seen as the center of learning and teachers need to have active participation. By applying this theory in the development of AR filters and evaluation of the AR filter in speaking fluency teaching, it means involving teachers as active participants in the design process in order to produce an active language teaching and learning environment with the use of AR filter.

2.5 Purpose statement and research questions

By analyzing the literature on various aspects outlined above, it was discovered that there were quite limited studies that have been conducted on speaking fluency teaching in public secondary school settings, but numerous studies have included the integration of AR in language learning and teaching, particularly in the English language. Yet, fewer studies have focused on AR filter integration in speaking fluency teaching, and no studies have attempted to examine the impact of AR filters on speaking fluency teaching, specifically by considering the perception of teachers in public secondary school settings. Therefore, the present study is intended to empirically evaluate how the AR filter can be best implemented in the teaching of speaking fluency by

considering the perception of teachers who are involved in the AR filter evaluation stage of the current study. The research question that guided this study was as follows:

RQ1. How can the AR filter be best implemented in speaking fluency teaching in the context of public secondary schools?

3. Research methodology

This study is a part of a larger DDR study which focused on the third stage which is the evaluation stage. The whole study is on the development of AR filters for speaking fluency teaching in the context of public secondary schools. In this final stage, which is the evaluation stage of the AR filter for speaking fluency teaching, this study followed a qualitative approach using semi-structured interview to provide rich descriptions on the participants' opinions by evaluating the AR filter for teachers speaking fluency teaching in public secondary schools.

3.1 Participants

The participants were six ESL teachers from six different public secondary schools in one of the districts in Kedah, a state in the Northern part of Malaysia (refer Table 1). In Malaysia, the average age range of public secondary schools students is 13 years to 17 years which include students from Form 1 to Form 5. Next, the district was chosen due to its high frequency of technology usage based on the data collected from the Kedah State Education Department. The participants were chosen based on purposive sampling (Campbell *et al.*, 2020) which includes selection criteria that include ESL teachers who have taught for more than five years, have a background in ELT during their undergraduate study and teach in public secondary schools. They only varied in their age, gender and origin.

3.2 Semi-structured interview

Before the semi-structured interviews were conducted, expert opinions were sought for the interview protocol to ensure that the expressions are clear, understandable and suitable for the scope. There were four demographic questions (gender, age, education and work experience) and six semi-structured questions in the interview form. The six questions asked

Participants	Gender	Educational background	Experience	Grade level (s)
Hazel	Female	Degree in Teaching English as Second Language, (TESL) Universiti Kebangsaan Malaysia	10 years	Form 4, 5, 6
Caramel	Male	Degree in TESL from Kota Bharu Teacher Education Institute	10 years	Form 4, 5
Khaki	Female	Bachelor Degree in TESL in the University of Portsmouth, UK	9 years	Form 1, 4, 5
Jade	Female	Master in English Language Teaching, Universiti Utara Malaysia (UUM)	12 years	Form 3, 4, 5
Auburn	Female	TESL Degree in Universiti Kebangsaan Malaysia (UKM)	24 years	Form 1, 4, 5
Magenta	Female	TESL Training program with Otago University, New Zealand and Ilmu Khas Teacher Institute, Malaysia	21 years	Form 4, 5

Source(s): Table by authors

Table 1. Participants' demographic details

in the interview include the following: (1) What do you think of the AR filter? (2) How will you use the AR filter for speaking fluency teaching? (3) What can be the effects of AR filters on public secondary school students? (4) What learners can best use the AR filter for speaking fluency teaching? (5) What advantages can this AR filter give in your speaking fluency teaching? and (6) How can this AR filter be best implemented in your speaking fluency teaching?

3.3 Data collection procedure and data analysis

In total, six participants from the four secondary schools took part in a 30-min, semi-structured interview to elicit data from the research participants. To maintain anonymity, pseudonyms were given to the participants. The interviews were analyzed thematically using the Braun and Clarke (2022) six stages of thematic analysis. These stages include interview data familiarization, code generation from the interview transcript, combining codes into themes, themes review process, determining significant themes and reporting findings. In ensuring the trustworthiness of the interview data, member-checking and expert evaluation of the themes emerged from the data were conducted. Member-checking was done through giving the participants the codes and the themes emerged to check whether they actually portrayed what the participants intended to say. Expert evaluation was done through the verification of themes and codes and quotations interpreted by the researchers so that it aligned with each other (Patton, 1999).

4. Findings

4.1 Participants' profile

Table 1 depicts the participants' demographic profile which shows that females comprised the majority of the participants. This is not because of gender bias, but this represents the proportion of ESL teachers in the chosen district. All teachers have more than five years' experience in teaching English.

4.2 Themes

There were three main themes generated from the interview data. The summary of the themes can be seen in Table 2.

Themes	Codes	Sub-codes
Theme 1: AR filters can be best used in various settings	Informal setting	• Outdoor environment • Technology-mediated platforms
	Formal setting	• Conventional lesson • Online lesson
Theme 2: AR filters can best support learners with different English language levels	All language learners' level	• High-proficiency learners • Low-proficiency learners • Moderate-proficiency learners
Theme 3: AR filters can be best used to cater to learners of diverse learning styles	All learners' style	• Auditory learners • Visual learners • Kinesthetic learners

Source(s): Table by authors

Table 2. Summary of themes, codes and sub-codes

4.2.1 Theme 1: AR filters can be best used in various settings. This theme indicated that ESL teachers think that AR filters can be best utilized in formal and informal settings and also the combination of both settings. In an informal setting, AR filters can be best implemented in two ways which are through outdoor environments and through technology-mediated platforms like WhatsApp, Telegram and QR code sharing. For instance, Teacher Khaki and Teacher Magenta reflected that they share the AR filter through the QR code and the link. Their responses can be seen as follows.

> I will share the QR code through their respective classroom WhatsApp group and let them practice the speaking task at home. They could redo the activity using the same template in the next lesson. It will help the pupils to build more confidence in speaking when they have ample time to prepare at home. I will let the pupils use their personal IG to practice using the AR filter, save the video and share it (the video) on their preferred page for classroom feedback- Teacher Khaki

> I'll be sharing the link to use it outside [the]classroom but not inside class then I'll ask them to try and share it with me. I have a Telegram group with my students, so I'll be sharing the learning materials here. For this filter, the link will be shared here as all my students have smartphones . . . Share the recording and send to WhatsApp- Teacher Magenta

For outside classrooms, teachers can record themselves and share through WhatsApp group, which the students watch. These practices were articulated by Teacher Hazel and Mr Caramel. Teacher Hazel mentioned, "Tomorrow [The next day], they will watch it. So I can use it outside and inside the classroom," while Mr Caramel indicated that,

> It [AR filter] is useful for assignment and post-lesson product at home because students cannot bring mobile phone to school . . . assignment at home so students can have ample time to check their recording rather than [the] final product.

In a formal educational setting, the AR filter can be best utilized in conventional or traditional classroom by face-to-face interaction and also inside formal classrooms but through the utilization of mobile devices such as smart phones, tablet computer or iPad. For instance, when using the AR filter in mobile devices, the participants provided reasons for this, and their comments are reflected as follows:

> I mean, inside the classroom- like now, we have the topic, Globetrotter, and we can be at [anywhere] everywhere. You get what I mean. We can be in London, for example we can be in London, in [the] United States, we can be anywhere. So, when using this filter inside the classroom, they can get engaged and be adaptive . . . So they can feel as if they are at the real place, they can see the clue on what they want to speak and they can start to speak from that picture or filter- Mr Caramel

> I'm going to use the filter and I will show it to them. I will demonstrate first, how I will use the filter. After that I will give them the task and I'm going to ask them to use the filter first, but of course with the permission from admin -Teacher Jade

> I think they can use it because it is like in examination, they get 1 minute to speak, so this is quite similar with examination format – Teacher Magenta

4.2.2 Theme 2: AR filters can best support learners with different English language levels. This theme implies that AR filters can be best implemented in supporting different levels of language learners, for instance, low proficiency, moderate proficiency and advanced learners. The participants highlighted these through the reasons such as the AR filter can be used to start conversation, give confidence and allow for creative ideas. The extracts are presented as follows:

> I think this developed AR filter is best used for pupils in [from] low to intermediate levels because these groups of pupils usually need some help to start the conversation- Teacher Khaki

> It [the AR filter] helps the less confidence students to speak as it definitely gives them confidence and maybe when they relate to their personal experience- Teacher Magenta

> I think advanced students have a lot of exposure. I think they know more than us so they need less guidance, very minimal guidance, because they are exposed to all of these technologies or apps you know. And they might come up with much more advanced and creative ideas for the recording. Because now when teachers asked them to record something on topic, you can see all kinds of fresh new ideas that we teachers have not thought about it - Teacher Auburn

4.2.3 Theme 3: AR filters can be best used to cater to learners of diverse learning styles. Theme three denotes the variety of learners' learning styles that can be best matched through the use of the AR filter. Although the participants did not clearly know about the impacts the AR filter can best provide for different learners' styles, they believed that it can clearly help their ESL learners speaking fluency learning and teachers teaching through the elements presented in the AR filter. The responses that portray this theme are presented as follows:

> But in my opinion, if the best learners' types, visual learners can best use this as they prefer to use pictures, diagrams, images and spatial understanding to help them learn- Teacher Hazel

> I think visual students would learn best using the AR filter. As they can see, hear the image, prompt, and sound. But it would also help those who have hard time to imagine the situation too- Mr Caramel

> I guess verbal and visual might be the one as learners can build more confidence and feel more included/meaningful in the learning process.- Teacher Magenta

> If you talk about auditory learners yes, I can see that they can benefit from it because you know, with the sound in the filter, they can hear it and feel it- Teacher Auburn

> To be honest, I believe all learners can benefit from this AR filter. But for me, maybe kinaesthetic learner can benefit more from this filter cause they can role play as tourist by wearing the digital hat while looking at the environment and move around in class or outside. So, they won't feel restricted and can feel more like they are really on holiday- Teacher Khaki

These are some of the comments recognized which indicated this theme. Hence, by leveraging AR filters, educators can create immersive and engaging environments. From the comments provided by the participants, visual learners can benefit from the vivid, interactive visuals that the AR filter provides, while kinesthetic learners can engage in hands-on activities that reinforce learning through physical interaction. In addition, auditory learners can gain from the integrated audio features that were embedded within AR experiences, enhancing their comprehension through sound.

5. Discussions

The data analysis revealed evidence that suggests the ESL teachers had perceived AR filters as an effective method for improving ESL speaking fluency instruction. The study has found significant positive perception of AR filters in speaking fluency teaching through the three themes emerged from the interview data. This finding is also aligned with previous studies that have confirmed the positive impact of AR filters on lesson delivery in language instruction (Zhu *et al.*, 2022).

The first theme uncovers how AR filters as a form of markerless AR technology can be best implemented in formal and informal settings. By identifying the integration of AR into both formal and informal educational environments, educators and researchers can better understand and meet the needs of the specific circumstances in which AR filter technology might be employed in language teaching and learning and so customize instructional approaches accordingly. For instance, aligned with study by Sommerauer (2019), he

designed and evaluated AR in an informal learning environment where he found that AR is effective in helping to acquire and retain mathematical knowledge. Although the study by Serdyukov (2021) found that formalism in an online setting may have negative effects on students' learning, the integration of AR can help to lessen the effect by the elements inculcated such as sounds, audios and background. Hence, every setting offers distinct possibilities when it comes to incorporating AR filters into educational activities. Moreover, past studies have focused more on AR filters as an entertainment and business tool, and thus, this recent study shed light on how to best integrate this technology in language teaching, specifically in ELT.

The second theme emerged is AR filters can be best implemented with different language learners levels. Participants indicated that teachers can best utilize the AR filter with low, intermediate and advanced learners since nowadays learners were found to be more tech-savvy as mentioned by Teacher Auburn and Mr Caramel. Thus, this study is also in line with other studies that mentioned the suitability of AR to be incorporated with various learners levels which include primary and secondary school students with various English levels (Abdelmagid *et al.*, 2021; Küçük *et al.*, 2014). Furthermore, even though ESL teachers did not address special educational needs (SEN) students because they are all from public secondary schools that divide normal class from SEN class, participants said that students with low language proficiency and lower cognitive level can benefit most from this AR filter. This is so as the AR filter provides them with the vocabulary and language within. This is somehow aligned with the study by Geroimenko *et al.* (2018) where they utilized AR with individuals with autism and cognitive disorder.

The third theme is that AR filters can be best incorporated with various students' learning styles. The participants mentioned that learners with diverse learning styles can benefit from AR filter incorporation in speaking fluency teaching. For instance, Teacher Magenta articulated that visual learners may benefit from pictorial cues provided in the AR filter as these pictures, diagrams, background and vocabulary provided (Tsai, 2020) may give learners clue, so instructors were not required to individually display it in the classroom. For auditory learners, they can listen to the sound in the AR filter which can capture their attention by making them feel as if they were in the situation for a more realistic experience while also enhancing their vocabulary to talk about the sound they can hear like bird sounds and wave sound. Additionally, for kinesthetic learners, the AR filter can benefit them by their engagement with digital objects or characters to participate in role-plays as they can move their head and the AR filter has the hat for them to wear, so immersive learning styles matter (Hsu, 2017). These findings are also aligned with previous research which mentioned that AR can support e-learning through kinesthetic or tactile learning (Alzahrani, 2020). Apart from that, the sounds and pictures were found to help teachers by immersing students in a reality-like situation that can further assist their teaching and students' learning. This can help to vary the ways teachers deliver speaking fluency lessons and meet the needs of learners with visual, auditory or kinesthetic learning. This is because a study also elucidates the importance of teachers to deliver curricular content to pupils using a variety of instructional methodologies (Jorif and Burleigh, 2022).

Other than the three themes previously discussed, the study result can be understood in two ways. First, it confirms the researchers' expectations of closely anticipating results where AR filters can be utilized positively in ESL speaking fluency teaching. This shows that developing AR filters based on elements agreed upon by experts has been successful in helping to promote speaking fluency teaching. Furthermore, from knowing how to best implement AR filters in speaking fluency teaching, the result of this study provides support for instructors looking for innovative ways to teach speaking fluency skill other than just using a conventional method. For instance, other than using traditional repetition techniques as a way to practice speaking fluency (Bozorgian and Kanani, 2017; Molina and Briesmaster,

2017), ESL teachers can incorporate this AR filter technology for their students' speaking fluency practice since they believed that the AR filter in Instagram that can be freely assessed can directly impact language learners with diverse learning styles if it is effectively integrated. Studies also elucidate that it is necessary to incorporate open-source digital learning tools and software to enable teachers to conduct student-centric teaching (Rizvi and Nabi, 2021). Second, although all the participants were found to have positive perceptions of the AR filter for their speaking fluency teaching and with the ESL learners, the result should be discussed critically as other study such as Ironsi (2024) found that teachers also found to have negative perceptions of AR such as it did not significantly improve learners language skills. For example, in few studies, the participants believe that using AR in second language acquisition classes requires careful implementation to avoid distracting learners and increasing mental load from the purpose of the programme (Alalwan *et al.*, 2020; Ironsi, 2024).

Aligned with the study objective, comprehending teachers' perspectives can provide rich description on the role of AR filter in contemporary times specifically in ESL speaking fluency teaching. Our findings demonstrated utilizing AR filters in teaching can effectively increase instructional experience which aligns well with other notable findings on AR technology (Abdelmagid *et al.*, 2021; Garzón *et al.*, 2020). Besides, as most studies conducted in ELT and learning were focusing more on marker-based AR, the utilization of markerless AR in this study via AR filters opens up new areas to be explored in English teaching. This is because the availability of AR filters in social networking sites as mentioned by the participants, such as TikTok, Instagram and Snapchat, has high potential to improve teaching process and not just to be used in entertainment (Rios *et al.*, 2018). Furthermore, AR filter utilization can be incorporated in other skills such as reading, writing and listening, and it can also be utilized in teaching and learning of other languages with various other students in rural areas (Rohaizat *et al.*, 2021).

6. Conclusion

The aim of the study was to explore ESL teachers' perception of AR filters with respect to the teaching of speaking fluency. The study revealed three pertinent themes on how the AR filters can be best implemented in the teaching of speaking fluency, namely AR filters can be best implemented in various settings, AR filters can be best utilized to support learners with different English language levels and AR filters can be best used to cater to learners of diverse learning styles. Although teaching speaking fluency through AR filters can still be considered as a novel concept, ESL teachers were found to have positive perceptions and experience of using this technology despite the limited exposure they have before they tried this technology.

7. Limitations and recommendations

Further study can be conducted by considering how the AR filters can be best implemented in learning through ESL learners' viewpoints since the present study only explored teachers' viewpoint. Besides, future study can include teachers in other secondary school institutions such private secondary schools and boarding schools so that rich description on how to best implement AR filters can be gained. A comparative study may also be made to explore the utilization of AR filters. Finally, this study was performed in the context of Malaysian public secondary schools where the exposure to AR filter technology among teachers is still considered in its early stage, so to enhance the result, further study can be extended to other countries, particularly those with well-versed ESL teachers in AR technology.

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Corresponding author
Nor Sanak Mohd Nabil can be contacted at: sanak.nabil@gmail.com