

A Systematic Review of E-Learning in Teaching And Learning of Speaking Skills

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Abstract

In light of the progress of information and communication technology development, e-learning is emerging as the paradigm of modern education. However, there is very little to none of the past systematic review that had been conducted on the users' attitudes towards e-learning and the effects of e-learning in teaching and learning of speaking skills. Therefore, the purpose of this systematic review is to synthesise the findings of studies related to users' attitudes towards e-learning and also the effects of e-learning in teaching and learning of speaking skills in any levels of education. This systematic review used 32 full-text journal articles from the year 2016 until 2020 from ERIC and JURN. Results of this review showed that the most used method in exploring the users' attitude towards e-learning and the effects of e-learning in teaching and learning of speaking skills was quantitative method. Overall, the results of this review showed that 90.9% of the users have positive attitudes towards e-learning and 100% of the past studies revealed that the use of e-learning has positive effects in teaching and learning of speaking skills despite some limitations.

Keywords: E-Learning, Attitude, Effects, Teaching and Learning, Speaking Skills, Education

Introduction

The influence of globalisation has brought tremendous changes to our education system. With the advancing information age, the emerging technology tools have created new opportunities for educational institutions and makes every space a possible learning space for everyone. A good example that could be seen is the increasing use of digital tools for teaching and learning that have gradually substituted the conventional tools like handouts, books, paper and pens (Steelcase, 2020). The COVID-19 pandemic is also another evidence to the dramatic change in education. It was reported in the media that online learning is at a distinctive rise, whereby teaching is undertaken on digital platforms due to the COVID-19 that has resulted in schools shut all across the world (Li & Farah, 2020). Also, in light of the progress of information and communication technology (ICT) development, the wide use of digital tools in teaching and learning is a paradigm change in modern education (Alphin, Chan & Lavine, 2017).

This method of learning is known as electronic learning (e-learning). To be precise, Whyte (2017) explains that e-learning is the use of electronic technologies which include a dozen software and platforms for teaching and learning that can be used with computers or mobile devices to create learning experiences. In addition, Horton (2011) further added that e-learning could emerge in a variety of forms like mobile learning, social learning and virtual classroom courses. The great advantage of e-learning is its ability to affirm and advance the relationships between learners and instructors as well as to overcome the limitations of time and space through the asynchronous and synchronous learning network model (Sun et al., 2008).

Today, there is no shortage of tools available for teachers who use e-learning in education particularly in the teaching and learning of speaking skills because the inclusion of digital tools in lesson delivery is becoming a norm. Teachers could utilise the digital tools available to provide input to the learners and create active interaction with them. According to Arkorful and Abaidoo (2015), e-learning is considered among the best methods to teach and learn speaking skills as it is highly flexible when limitation of time and place are highly considered. It is also a very efficient way of delivering lessons online because teachers could easily access to a vast amount of information through a variety of online resources. According to Oluborode and Olofintuyi (2014), e-learning is also perceived as a fun way of teaching and learning speaking skills as it could increase the learners' motivation and encourage collaboration through the use of interesting multimedia platforms.

Despite the rapid development of e-learning, there is a need to investigate the users' attitudes towards e-learning and the effects of e-learning in teaching and learning of speaking skills. In this instance, teachers and learners would be the key determinant because they are the major implementors in this process. Their attitude would also be the primary factor to be considered in determining its smooth implementation. Meanwhile, administrator in schools would be benefitted from this review as they could identify the users' challenges and help to find solutions so as to maximise the effectiveness of e-learning. Stakeholders could also get down to the users' view and perspective to fulfil their needs in order to make the implementation a smooth and effective one.

There were several studies that had been done on the users' attitude towards e-learning and its implementation in teaching and learning of speaking skills in various contexts (Rafiq, Hussain & Abbas, 2020; Yilmaz, 2017; Banditvilai, 2016). However, there is very little to none of the past systematic review that had been conducted on the users' attitude towards e-learning and the effects of e-learning in teaching and learning of speaking skills (Rodrigues et al., 2019; Kaliisa & Picard, 2017). Therefore, the purpose of this review is to synthesise the findings of studies related to a) users' attitude towards e-learning and also b) the effect of e-learning in teaching and learning of speaking skills in any levels of education. The researcher would first define e-learning in the context of teaching and learning of speaking skills. Then, two research questions: a) What are the users' attitude towards e-learning? and b) What are the effects of e-learning in teaching and learning of speaking skills? were formulated to guide the researcher in choosing appropriate articles to review. Then, the researcher would synthesise the findings from the articles to answer both of the research questions.

E-Learning in Teaching & Learning of Speaking Skills

E-learning is a worldwide trend in educational institutions (Arkorful & Abaidoo, 2015). According to Littlejohn and Pegler (2007), e-learning is an umbrella term used to describe 'networked learning', 'online-learning', 'computer-assisted learning' and 'web-based

instruction'. They added that e-learning is the combination of electronic environments and physical teaching spaces across time zones in real time. Also, Arkorful, and Abaidoo (2015) reveal that e-learning is the use of ICT to enable the access to online learning and teaching resources. This is in line with Algahtani (2011) who perceived e-learning as a method of learning based on the use of computer and Internet.

According to Safran, Helic and Gütl (2007), e-learning supports the socio constructivist pedagogical strategy where learners could interact and learn together using technologies to perform speaking activities like discussion or collaborative projects. This would put learners at the centre of learning thus make learning more meaningful for them. This is also evident when Safran, Helic and Gütl (2007) further mentioned that e-learning tool such as podcast is used in teaching and learning of speaking skills to involve learners directly in the production of learning content. Precintha et al. (2019) also identified a few e-learning applications to teach speaking skills that appeal to learners like Flip grid, Voki, Blendspace and Video scribe.

According to Clark (2003), the use of these e-learning applications could increase the learners' motivation and support learner-centred approach which is one of the features of successful learning. This is in line with a study done by Mansor and Yunus (2017) on the use of Blendspace. The results revealed that 60% of the undergraduates find learning English speaking skills more fun. Meanwhile, Manty et al. (2017) found in their research that Voki application has helped the undergraduates to improve their speaking skills and they showed positive attitudes towards the use of Voki in language learning. These educational applications make it seamless for the users to share information between the virtual classroom and their favourite applications to make learning possible beyond limits. In short, it could be concluded that e-learning is a teaching and learning method that utilises digital tools and Internet to facilitate learning process regardless of the boundary of distances.

Method

In this systematic review, the researcher applied the five steps of method used behind the process of carrying out a systematic review that was proposed by Khan et al. (2003).

Step 1: Framing Questions for A Review

According to Sun and Chen (2016), the rapid expansion and growth of e-learning started since the advent of the World-Wide Web (WWW) in 1991. Meanwhile, the current COVID-19 pandemic has further accelerated the development of e-learning environments within educational institutions. Therefore, this systematic review aims to analyse the users' attitudes towards e-learning and also the effects of e-learning in teaching and learning of speaking skills in any levels of education. In line with this, two research questions are formulated: a) What are the users' attitudes towards e-learning? and b) What are the effects of e-learning in teaching and learning of speaking skills?

Step 2: Identifying Relevant Work

The second step in a systematic review is identifying relevant work. In this step, the researcher used two main databases namely ERIC and JURN to capture as many relevant citations as possible and to identify primary studies on users' attitudes towards e-learning and the effects of e-learning in teaching and learning of speaking skills. ERIC is an online digital library of education research and information whereas JURN is another database used to search for millions of free academic articles and books across multiple disciplines. Based on

the search from these two databases, the researcher chose only up-to-date studies that were published between 2016 and 2020 because an understanding of the current literature is significant for a research study (Maggio, Sewell & Artino, 2016). As a result, the search using the keywords “attitudes towards e-learning” and “e-learning and speaking skills” in ERIC database had resulted in 183 studies published between 2016 and 2020. Then, the researcher removed 78 studies because there is no access to the full text. Next, the second database, JURN, was used to search for relevant work. The search using the keywords “attitudes towards e-learning” and “e-learning and speaking skills” in JURN database had resulted in 109 studies published between 2016 and 2020. This makes up a total of 214 studies when added to the previous results gathered from ERIC database.

Step 3: Assessing the Quality of Studies

In this systematic review, the researcher has also established inclusion and exclusion criteria for article selection as shown in Table 1 to assess the quality of studies used.

Table 1

Inclusion and exclusion criteria

Factors	Inclusion Criteria	Exclusion Criteria
Date	Published between 2016 and 2020	Published before 2016
Exposure of interest	1. Attitude towards the use of e-learning 2. The effects of e-learning in teaching and learning of speaking skills	1. Attitude towards the use of e-learning is not included 2. The effects of e-learning in teaching and learning of speaking skills is not explored.
Participants	From various levels of education	Not from any levels of education
Reported outcomes	Access and evaluate the use of e-learning in teaching and learning of speaking skills and explore the users' attitude towards e-learning	Did not access and evaluate the use of e-learning in teaching and learning of speaking skills and no reported outcomes on the users' attitude towards e-learning
Type of publication	Original studies published in journal	Other than journal

Based on these inclusion and exclusion criteria, the studies were sorted and only studies that met the inclusion criteria were included whereas studies that clearly met one or more of the exclusion criteria were excluded. In this systematic review, 182 articles which did not meet with the inclusion and exclusion criteria were removed, leaving 32 articles to be included in this review.

Step 4: Summarizing the Evidence

At this step, the researcher abstracted data from each of the individual primary studies to facilitate the summary presentation of the results to the readers. Two final 'Summary of evidence' tables which include the authors, phenomenon of interest and synthesised findings are presented to answer the two research questions.

Step 5: Interpreting the Findings

In the last step, the researcher interpreted, discussed and set out the implications for practice or future research from the findings of the systematic review. The researcher also employed content analysis to reveal the trends of the approaches used in the past studies to find out either the studies utilised quantitative, qualitative or mix-method approach. Additionally, the level of participants is also analysed in this review. Table 2 showed the frequency of each approach used among the total of 32 articles. The mostly used approach that had been conducted by previous studies is quantitative approach, followed by mix-method and qualitative method. The participants in the studies are mostly university learners as reviewed in Table 3.

Table 2

The approach implemented in past studies

	Databases	ERIC	JURN	Total
Approach				
Quantitative		8	10	18
Qualitative		5	0	5
Mixed-method		4	5	9
Total		17	15	32

Table 3

Participants' level of education

	Databases	ERIC	JURN	Total
Level of learners				
School learner		0	1	1
University learner		17	14	31
Total		17	15	32

Results

The articles selected to be synthesised in this systematic review highlighted on two main topics: (i) the users' attitudes towards e-learning and (ii) the effects of e-learning in teaching and learning of speaking skills. Therefore, the results of this systematic review will be discussed in two sections pertaining to the two main topics highlighted in the articles.

Users' Attitude towards E-Learning

Majority of the past studies (n=20, 90.90%) revealed that the users' attitude towards e-learning is positive and the responses from the users are mostly due to the influence of several factors. The factors influencing the users' attitudes towards e-learning are summarized in Table 4 while the discussion of each author is represented in Table 5.

Table 4

Summarization on the factors influencing users' attitudes towards e-learning

Influencing Factors	Frequency
Perceived usefulness, perceived ease of use, social influence, quality of life (TAM Model)	6
Effectiveness of e-learning	4
Self-efficacy	4
E-learning experience	3
Level of innovativeness	3
Teachers' quality & designed model of teaching	2
System Quality	2
Study method	1
Academic achievement	1
Performance expectancy & effort expectancy (UTAUT Model)	1
Gender	1

Table 5

Summary of evidence on the users' attitude towards e-learning

No	Authors	Phenomenon of Interest	Synthesised Findings
1.	Özcan, Gökçearsan & Solmaz 2016	Pre-service teachers' attitudes towards e-learning	1. Pre-service teachers' levels of innovativeness positively influence their attitude towards e-learning.
2.	Iwata, Wang & Clayton 2019	Students' perceptions about the use of digital badges	1. The use of digital badges can motivate the students and promote learning autonomy.
3.	Ikhwan & Widodo 2019	The role of blended learning based on teacher's perception with respect to the students' attitude	1. Students are getting good scores in English because they are motivated to participate in blended learning. 2. Students' attitude has a positive correlation with the teacher's designed model of teaching in blended learning.
4.	Yalman, Basaran & Gönen 2016	Attitudes of students towards e-learning management system	1. Students who preferred individual work have positive attitudes towards e-learning due to the individualized e-learning environments.

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| 5. | Chaka & Govender
2017 | Students' perceptions and readiness towards mobile learning | <ol style="list-style-type: none"> 1. Students had positive perceptions towards mobile learning. 2. Students' positive perceptions towards mobile learning were influenced by four constructs namely performance expectancy, effort expectancy, social influence and mobile learning conditions. |
| 6. | Alzahrani 2017 | Students' knowledge of e-resources and attitudes towards e-resources | <ol style="list-style-type: none"> 1. Students' attitude towards e-resources is positively influenced by their knowledge of e-resources. |
| 7. | Al-Juda 2017 | Distance learning students' evaluation of e-Learning system | <ol style="list-style-type: none"> 1. The students' positive attitude towards e-learning system has a positive relationship with the effectiveness of e-learning system provided by the university. |
| 8. | Iqbal 2017 | Students' perception towards m-learning | <ol style="list-style-type: none"> 1. Students generally have positive attitudes towards m-learning due to the factor of perceived usefulness but students from different degree programs have different perception towards the usage of mobile phones in educational context. |
| 9. | Oyaid & Alshaya
2019 | Students' views, perceptions, and future intentions towards e-books | <ol style="list-style-type: none"> 1. Almost all of the students found the use of e-book beneficial. 2. They were really satisfied with the interactivity and the highlighting, changing of font size and hyperlink features. |
| 10. | Karaaslan & Kılıç
2019 | Students' attitudes towards blended language courses | <ol style="list-style-type: none"> 1. High-achievers had positive attitudes towards all learning aspects. 2. Low-achievers required more interaction and study management support. |
| 11. | Eltahir 2019 | The perspective on the efficiency and usability of e-learning courses | <ol style="list-style-type: none"> 1. There is a great need to conduct more training for freshman students on how to use Moodle while most staff members are satisfied with the Moodle system. |
| 12. | Faramarzi, Tabrizi
& Chalak 2019 | Learners' perceptions and attitudes towards second | <ol style="list-style-type: none"> 1. Learners viewed the |

	language (L2) vodcasting tasks in an e-learning project	experience as significantly positive and constructive. 2. The application is user-friendly and suitable to be used to teach listening skills. 3. The experience is regarded as enjoyable.
13. Yakubu 2019	The effect of quality antecedents on the acceptance of learning management systems (LMS)	1. Instructor quality and system quality were found to significantly predict the student's behavioural intention to use the LMS.
14. Revythi & Tselios 2019	Assessing behavioural intention to use e-learning based on Technology Acceptance Model (TAM)	1. Social norm, system access and self-efficacy significantly affect behavioural intention to use LMS.
15. Kisanga 2016	Teachers' attitudes towards e-learning	1. Teachers have positive attitudes towards e-learning. 2. Their attitude is largely influenced by their computer exposure level.
16. Yorganci 2017	Students' self-efficacy and attitudes towards mobile learning	1. Majority of students had positive attitudes towards m-learning. 2. Gender differences existed in the students' attitudes.
17. Ozturk, Ozturk & Rasit 2018	The relationship between prospective teachers' readiness and satisfactions about web-based distance education	1. The levels of readiness and satisfaction of the prospective teachers were found to be positive because their aims, needs and expectations were met during the program.
18. Wasserman & Migdal 2019	Teachers' attitudes in online and traditional training courses	1. There was a significant difference in the attitudes towards ICT between online and traditional training courses which correspond to the perceived usefulness (PU) component in the TAM model.
19. Emine & Kalelioglu 2019	Students' perspective on a fully online course experience	1. Students found distance learning educational, efficient, useful, and appropriate for the course. 2. The course taken through distance education helped students to gain

			computer and internet self-efficacy as well as develop their self-directed learning skills.
20.	Edmondson & Ward 2017	Students' attitudes towards textbook types	1. Students still prefer paperback textbooks.
21.	Bahiti & Farizi 2018	Lecturer' attitudes towards e-learning according to demographic variables	1. Lecturers' have high attitude towards e-learning and their attitude scores have significant differences with factors of teaching experience and e-learning experience.
22.	Vululleh 2018	Students' e-learning acceptance in developing countries	1. Student's behavioural intention to accept and use e-learning in developing countries was affected by their perceived usefulness, perceived ease of use, quality of life and social influence.

The Effects of E-Learning in Teaching & Learning of Speaking Skills

All of the past studies (n=10, 100%) revealed that the use of e-learning has positive effects on teaching and learning of speaking skills despite some limitations. The effects of e-learning in teaching and learning of speaking skills are summarized in Table 6 and the discussion of each author is represented in Table 7.

Table 6

Summarization of the effects of e-learning in teaching & learning of speaking skills

Effects of e-learning	Frequency
Improving listening & speaking in terms of grammar, vocabulary, intonation and coherence	8
Motivating	2
Promoting autonomous learning	1
Tracking and monitoring learners' progress become efficient	1

Table 7

Summary of evidence on the effects of e-learning in teaching & learning of speaking skills

No	Authors	Phenomenon of Interest	Synthesised Findings
1.	Mošatová & Výškrabková 2019	Developing complex language skills and cognitive competence in the distance learning of Slovak	1. The use of recordings and essays in the tutor-supported e-slovak courses and written or audio feedback by tutors for each assignment proved to be motivating.
2.	Banditvilai 2016	Enhancing students' language skills through blended learning	1. Online practice is beneficial to enhance the four language learning skills, autonomous learning and learner motivation.
3.	Frolova 2017	Electronic means of foreign language learning in the system of higher education	1. E-learning courses can be delivered on any platform to track and monitor learners' progress in the course in an efficient manner.
4.	Watanapokakul 2018	The role of edutainment in the teaching and learning of English focusing on students' listening and speaking skills	1. Students' listening and speaking ability increased after they had been exposed to CULI ZOO.
5.	Tseng & Yeh 2019	The effect of video and written feedback on student preferences of English-speaking practice	1. Written and video feedback was useful for the learning of grammar rules, word usage and improvement of intonation.
6.	Montiel-Chamorro 2018	Comparing online English language learning and face-to-face English language learning	1. The online students who completed all the content of the course scored higher in English than those of their face-to-face counterparts.
7.	Perveen 2016	Synchronous and asynchronous e-language learning	1. Asynchronous e-language learning was quite beneficial for L2 learners but there are also some limitations which could be scaffolded by synchronous sessions.
8.	Köroğlu & Çakır 2017	The use of flipped instruction in language classrooms	1. It was found that flipped instruction in language classrooms could help to develop fluency,

	to develop speaking skills	coherence, lexical resource, grammar, pronunciation and accuracy skills.
9. AlSaleem 2018	The effect of Facebook activities on enhancing oral communication skills	1. The suggested Facebook activities in the study were effective on improving participants' oral communication skills.
10. Herrera & González 2017	Developing the Oral Skill in Online English Courses	1. Participants scored higher in the oral final exam and showed improvement in terms of grammar, vocabulary, and pronunciation.

Discussions

Previous studies have highlighted discussion on the users' attitudes towards e-learning and the effects of e-learning in teaching and learning of speaking skills. The results of these studies revealed that majority of the users (n=22, 90.9%) have positive attitudes towards e-learning and that they were satisfied with e-learning (Özcan, Gökçearsan & Solmaz, 2016; Iwata, Wang & Clayton, 2019; Ikhwan & Widodo, 2019). They perceived the use of e-learning as a method of learning that could motivate the learners and enhance their learning autonomy (Iwata, Wang & Clayton, 2019; Ikhwan & Widodo, 2019). This is in line with a study done by Faramarzi, Tabrizi and Chalak (2019). The results revealed that e-learning experience is enjoyable and the application used to facilitate e-learning is also regarded as user-friendly. This could make learning efficient as it is evident when Ikhwan and Widodo (2019) found in their study that the learners' English language achievement was improved after the use of e-learning. In line with this, there is also a past study which showed that distance learning is efficient and useful to the undergraduate students as it helps them to gain computer and internet self-efficacy as well as to improve their self-directed learning skills (Emine & Kalelioglu, 2019). From these past studies, it can be concluded that the users felt positive towards the use of e-learning. Hence, it is undeniably true that e-learning could be an effective way of learning especially in this globalisation as it could motivate learners to engage actively in learning.

Although majority of the studies have shown positive attitudes towards e-learning, one past study revealed that e-learning is only suitable for students who preferred to work individually as e-learning centred on individualised learning environment (Yalman, Basaran & Gönen, 2016). Another study done by Karaaslan and Kılıç (2019) showed that e-learning is less suitable for the low achievers although high-achievers were seen to have shown positive attitudes towards e-learning in all learning aspects. The reason is because low achievers need more face-to-face guidance, interaction and learning support, thus this result suggested that the users' academic achievement could have an impact on their attitudes towards e-learning. Additionally, the use of eBook also does not receive positive response from the users and many still prefer paperback textbooks (Edmondson & Ward, 2017). Meanwhile, there is a past study that shows a need to train the freshman students in using e-learning to improve the efficiency of language learning due to their lack of e-learning experiences (Eltahir, 2019).

These imply that users' attitude towards e-learning could be governed by a few influencing factors which play major roles in determining the effectiveness of e-learning.

As seen in the above-mentioned situation, several factors influencing the users' attitudes towards e-learning should be taken into consideration as they could significantly affect the implementation of e-learning in education. Based on the past studies conducted, most of the researchers (n=6, 60%) agreed that the users' attitudes towards e-learning is highly affected by factors of perceived usefulness, perceived ease of use, social influence and quality of life as suggested by Davis (1989) in Technology Acceptance Model (TAM). This is followed by the effectiveness of e-learning and self-efficacy, as they had contributed 40% to the influencing factors respectively. Other factors were the users' e-learning experiences and level of innovations because 30% of the past studies (n=3) found that these factors could influence the users' attitudes towards e-learning. Meanwhile, teachers' quality and the designed model of teaching used as well as the quality of the system had contributed 20 % respectively to the influencing factors. On the other hand, study method, academic achievement, gender as well as performance expectancy and effort expectancy as suggested in UTAUT model are also factors identified in the past studies that could influence the users' attitudes towards e-learning.

In terms of the effects of e-learning in teaching and learning of speaking skill, all of the past studies (n= 10) revealed positive results despite some limitations encountered in e-learning. Studies showed that the use of ICT tools and digital platforms in e-learning were able to motivate the learners, enhance four language skills particularly oral communication skills and encourage autonomous learning (Mošatová & Výškrabková, 2019; Banditvilai, 2016; AlSaleem, 2018). There were also studies which revealed that the use of e-learning could improve speaking skills in terms of grammar rules, word usage, intonation and pronunciation while some studies suggested that it helped to develop fluency, coherence, lexical resources and accuracy skills (Tseng & Yeh, 2019; Koroğlu & Çakır, 2017; Herrera Díaz & González Miy, 2017). These results indicated that the use of e-learning could be an effective method to motivate and encourage speaking among the learners. It could maximise the learners' learning experiences and leave positive impacts in the teaching and learning of speaking skill. Additionally, there is also another study which shows that e-learning could help to track and monitor learners' progress efficiently (Frolova, 2017). This suggested that e-learning could also assist the teachers in their teaching besides facilitating the learners' learning of speaking skill. However, a study done by Perveen (2016) revealed some limitations of e-learning that need to be scaffolded by synchronous sessions (Perveen, 2016). Hence, it can be seen that e-learning could positively affect the teaching and learning of speaking skill but at times, there could also be some limitations.

Conclusion

As a conclusion, e-learning is emerging as a trend in education with the rapid development of technology. It is widely used in many parts of the world and has become the preferred choice of many people in education. Previous studies showed that majority of the users have positive attitudes towards e-learning as it could enhance learners' autonomy and make learning efficient. In terms of the impact of e-learning on teaching and learning of speaking skills, studies also showed that e-learning could motivate the learners and enhance oral communication skills in terms of grammar rules, word usage, intonation, pronunciation, fluency, coherence, lexical resources and accuracy skills. However, there are a few studies which showed the limitations of e-learning. It was found that e-learning could not facilitate

group assignment due to its individualised learning environment. Some studies also revealed that e-learning is less appropriate for low achievers as they need more support from the teachers. Overall, this systematic review would benefit the teachers and learners as it enlightens the users on a new alternative in teaching and learning, at the same time, inform the users on its limitation so as to better facilitate the implementation of e-learning in the future. Thus, teachers could plan their teaching and learning strategies while learners would be able to maximise their learning experiences. In short, e-learning could still be an effective method of learning in this globalisation. Majority of the users had showed positive attitudes and response towards e-learning particularly in teaching and learning of speaking skills despite several limitations of e-learning that need to be improved through synchronous sessions.

Abbreviations List

Abbreviations	Full Form
ICT	information and communication technology
L2	second language
LMS	learning management systems
PU	perceived usefulness
TAM	Technology Acceptance Model
WWW	World-Wide Web

Availability of Data and Materials

All data generated or analysed during this study are included in this published article (refer to the reference list).

Competing Interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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Authors' Contributions

All listed authors had substantially contributed to the analysis and interpretation of data for the work, drafted the work or revising it critically for important intellectual content, approved the final version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. We hereby attest that all authors had contributed significantly to the creation of this manuscript. We confirm that the manuscript has been read and approved by all named authors. We confirm that the order of authors listed in the manuscript has been approved by all named authors.

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