Online Course Design Using VoiceThread with TPACK Model to Enhance English Speaking Skills for Non-native Learners

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Abstract—Learning English as a foreign language (EFL) and computer technology are two fundamental skills for learners majoring computer science and control engineering not only for the use in academic fields but also for the means of communication worldwide. Among language skills, speaking is a core output element that all learners wish to achieve. This research looked into TPACK (Technological Pedagogical and Content Knowledge) model with an aim to design an online English speaking course for non-English majored learners using VoiceThread as an instrument. Twelve Japanese students participated in the study over 12 weeks. The researcher used internal-service speaking criteria and a self-designed course satisfaction questionnaire based on TPACK model dimensions to collect quantitative data analyzed by R-studio software. Qualitative data were collected and analyzed by content analysis from interviews. The results of this study were discussed in terms of the learners' progress as well as their satisfaction and the perceptions about using VoiceThread via Zoom and Google Classroom online learning platforms. The TPACK model suggested an effective teaching approach for teachers that can enhance non-native learners' English speaking performance.

1   Introduction

Technology has profoundly changed how knowledge is transmitted and acquired, from exclusively classroom-based organization to the hybrid of online environment. Particularly under the sudden shift to online learning tendency in the initial COVID 19 period, online learning is suggested as one of the effective strategies that can help enhance the teacher-students' interaction [1, 2]. Amid the trend of globalization and the advancement of information and communication technology (ICT), EFL and ICT competence have become two crucial skills in the educational settings for non-native students as well as teachers. Learning EFL and ICT are fundamental for learners majoring computer science and control engineering not only for the use in academic fields but also for the means of communication worldwide. Students are expected to

develop themselves through ICT competence and computing literacies [3, 4]. With the assistance of information technology, learners are provided with challenges and opportunities to optimize knowledge and skills through online learning [5]. There have been several studies revealing the positive impacts of integrating technology into teaching and learning on the students' achievement [6, 7, 8]. With mobile devices, such as smartphones, tablets or computers, students were able to enhance their outcomes if mobile devices are integrated to the learning process frequently [4].

Speaking is paramount in the field of foreign language acquisition, which is a crucial part of foreign language education [9, 10]. Learners and teachers in Japanese's universities recognize the acquisition of English as an important language skill for non-native learners [6, 11]. Among language skills, speaking is the core output that many Japanese learners desire to improve [4]. There is a growing recognition at tertiary level in Japan that enhancing university learners' EFL abilities with ICT assistance is important. However, EFL and ICT seem yet to be well discussed in computer engineering education for non-native learners in Japan.

One technological tool that can enhance student engagement, collaboration, and motivation is VoiceThread [12, 13]. Students can use VoiceThread to participate and collaborate in many ways at their own pace [14]. Due to VoiceThread's various features, many language teachers use it as an alternative for oral presentations and speaking performances [15].

Regarding the use of technology in the classroom, Mishra and Koehler proposed a technological, pedagogical and content knowledge (TPACK) framework for educators [16]. This framework comprises seven domains: (1) Technological Knowledge (TK); (2) Content Knowledge (CK); (3) Pedagogical Knowledge (PK); (4) Pedagogical Content Knowledge (PCK); (5) Technological Content Knowledge (TCK); (6) Technological Pedagogical Knowledge (TPK); and (7) Technological Pedagogical and Content Knowledge (TPACK). The TPACK framework is concerned with the effective use of technology in the teaching and learning process [17].

This paper considers how the TPACK framework can be used to gain an understanding of technology use in teaching and learning English speaking to non-native learners in Japan.

The use of technology in higher education is largely accepted to be an integral part of the student experience. The use of VoiceThread served as the independent variable in the study as the experimental group used this tool to practice speaking.

This paper looks at the implications of applying a TPACK framework to teaching and how technology can affect students' approach to learning. We look at how technology can be incorporated effectively into teaching and learning for the sake of shifting the learners' autonomy. With is aim, the research questions that guided this study are the following:

1. Are there any improvements in the learners' English speaking progress after the course with using VoiceThread based on TPACK areas of knowledge?
2. How do the student participants perceive TPACK areas of knowledge in the online course design?

Integrating technology in the classroom becomes an exciting approach to language learning [18]. Technology has now become part of language learning throughout the world at different levels [19]. Employing innovative technological tools can promote student engagement, motivation and ultimately increase the students' quality of learning experience [20].

2 Literature reviews

2.1 Information and communication technology (ICT) in online language learning

Integrating technology in the classroom becomes an essential approach to language learning. Technology is gradually becoming ubiquitous in education and has a significant positive effect on students' learning [20]. Technology has now become a part of language learning throughout the world at different levels [21, 22].

There have been several studies looking into the application of ICT into teaching in general. Kalogiannakis and Papadakis found that ICT was highly recommended to use in pedagogical approaches [23]. Technology was applied to an online course in for a group of instructors on different campuses and academic fields.

The online environment is of great help. It has the potential to provide a more relaxed atmosphere in which language learners are willing to participate and teachers take on more of a facilitator role [24]. The online environment, especially Web 2.0 tools as ICT assistance, helps students create a sense of community so that they feel less anxious, without the fear of being directly negatively evaluated by the teacher [25]. Online learning is beneficial as it can reduce the learners' anxiety and shyness when they shape their learning in their own pace [26, 27, 28].

Furthermore, the online environment provides students with a medium to practice communicating in the target language for the purpose of increasing EFL speaking skills and a reduction in withdrawal or failure [27]. In terms of learners' autonomy, online learning is stably formed as there is a tight connection between autonomous learning and online learning success [22, 26]. Gaining a better understanding of how students learn, when technology has affected the context of learning, could be used to develop better technology-driven learning environments.

2.2 TPACK model in language learning

A comprehensive instruction framework TPACK model may offer a promising perspective for technology facilitated learning.

Teachers' knowledge of technology, and how technology is integrated into the curriculum, has become a major focus of research [6, 11, 18, 29].

Mishra and Koehler stressed that, as well as being technology users, teachers should gain a proper understanding of the technology to teach particular content and how content could be altered to make teaching with technology more meaningful for learners [16]. This TPACK model was established based on the integration of techno-

logical, pedagogical and content knowledge, could lead to innovative ways of incorporating technology into existing teaching practices (Figure 1).

TPACK framework describes each areas of knowledge introduced by Mishra and Koehler [16] as follows:

1. Technological Knowledge (TK) is about the ways the teacher works with various technological resources.
2. Content Knowledge (CK) incorporates teachers' knowledge about the subject matter to be learnt or taught.
3. Pedagogical Knowledge (PK) is the approach to teaching, including students' learning, class management, lesson planning, and learner assessment; all of which are also emphasized simultaneously.
4. Pedagogical Content Knowledge (PCK) is knowledge of how to combine pedagogy and content in an effective manner.
5. Technological Content Knowledge (TCK) refers the subject content and student practice taught through appropriate technology.
6. Technological Pedagogical Knowledge (TPK) requires general pedagogical strategies applied to the use of technology.
7. Technological Pedagogical and Content Knowledge (TPACK) is the basis for effective use of technology in teaching and a condition for efficient adoption of ICT in the teaching and learning process.
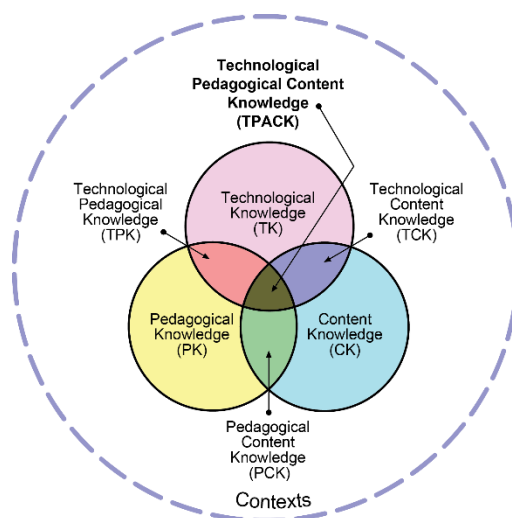

Fig. 1. TPACK model by Mishra and Koehler (2006)

Although TPACK application is increasingly drawing attention from educational researchers. It has been discussed neither in the field of information science and control engineering nor in the EFL speaking learning for non-native learners. In this study, the framework was utilized, specifically addressed TPACK development in tertiary online learning environment, along with the implementation of a speaking

skill training program. The TPACK model was applied to design an online collaborative English speaking course for undergraduate students in Japan. Hence, the TPACK framework is appropriate for this study since it provides key areas of knowledge underpinning competency and the perceptions of non-native learners and teacher towards the integration of VoiceThread into their teaching and learning English speaking.

2.3 VoiceThread in language learning

Findings revealed that VoiceThread is a supportive online learning tool to help students complete their assigned tasks, increase comprehension, and improve their oral communication skills with less stress and anxiety, resulting in better learning. [13, 14].

VoiceThread is an interactive, multimedia technology that is easily accessible, cost-effective, and applicable to any grade level or subject area [15]. The use of Voice Thread served as the independent variable in the study as the experimental group used this tool to practice speaking. Language learners can create and comment using Voice Thread and then publish the thread online. Plus, VoiceThread is utilized as a useful tool for homework assignments, practicing listening and reading skills and using virtual realia [30].

Since English speaking creates increased level of difficulties in learning EFL for non-native learners, it is crucial for the learners to be exposed to voice-conferencing technologies to enable richer level of communication [31, 32].

However, it is not widely used in many educational settings, thus, this study aims to consider VoiceThread as a tool to apply into teaching and learning speaking EFL for non-native students in Japan. Since Voice Thread is a relatively new technology, minimal studies exist in the literature that provides empirical findings on how it has been used in the educational setting [30]. The current work may contribute to the findings of previous studies about ICT integration into EFL education for non-native learners in online learning environment.

In the current study, the researchers attempt to fill a gap in the literature by examining the use of asynchronous voice-conferencing for language learning, and its effects on EFL speaking skills in the university foreign language classroom.

3 Methodology

3.1 Setting and participants

Case study was employed as the research design in this study because it provides an in-depth investigation with identified groups of participants [33]. This study was undertaken at a laboratory of information science and control engineering and a laboratory of civil engineering at two universities in Japan.

Regarding the participants, twelve 3rd- and 4th- year Japanese engineering majored students and the EFL teacher took part in this research voluntarily. Participants were

all aware that EFL is an essence both for their academic achievements and future development. Thus, they had strong learning motivation when deciding to take part in the pilot study. After understanding the procedures and introduction to VoiceThread tool, students were randomly assigned into four groups consisting of three members each for the sake of peer review activities.

3.2 Instruments

In this study, VoiceThread, Google Classroom and Zoom were employed to conduct online lessons.

Besides, internet connection was required to stay stable every time the class was held for the sake of consistency. The ICT tools are shortly described as follows:

− VoiceThread is a cloud application, and works in any modern web browser. It is used to upload images, audio files, and videos on which one can give comments using one of the five commenting options, namely microphone, webcam, text, phone, and audio file. It also provides an asynchronous context to have more time for planning and can contribute to their speaking accuracy and reduces frustration level [34].
− Google Classroom is a free collaboration tool for teachers and students. Within the Google Classroom, teachers are able to update the announcements and upload learning materials for learners' approaching. Google Classroom was used to facilitate the interaction of a teacher with a student or among students in an online environment [35].
− Zoom is a cloud based service which offers Meetings and Webinars and provides content sharing and video conferencing capability. Zoom provides teachers and learners with an easy, reliable cloud platform for video and audio conferencing, collaboration, chat, and webinars across mobile devices, desktops, or telephones [36].

Figure 2 is the example of an online lesson using VoiceThread via Zoom platform.

Speaking practice activities for the study group were held via VoiceThread, an asynchronous voice-conferencing technology that allows learners to communicate by posting voice recordings to a web page using cell phones or microphones to record their voices from a computer. The speaking activities created for this study covered topics from the book "Headway Academic Skills: Reading, Writing and Study Skills" focusing on job recruitment preparation and interviewing skills [37].
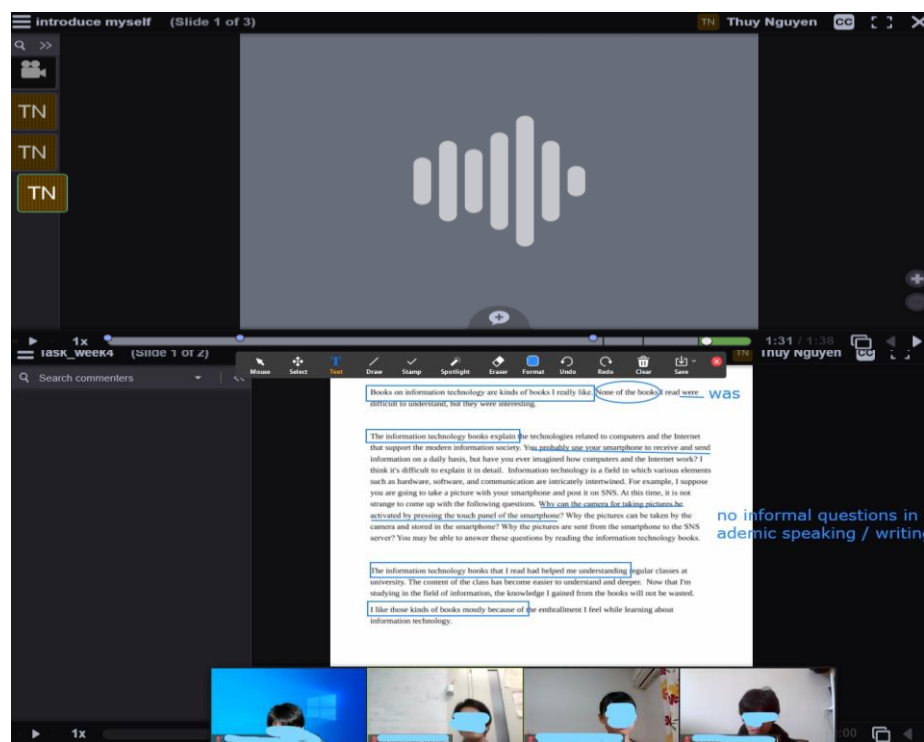
Fig. 2. Example of VoiceThread and zoom meetings

3.3 Procedures

The present study was conducted within 12 weeks over the period of an academic semester. The course delivery is described as follows:

- Weeks 1:
  - A placement test: overview of the English proficiency: Q Placement Tests [38, 39]
  - Pre-treatment surveys for learners' understanding and experience of VoiceThread in learning English and about TPACK Model
  - Introduction to the application of VoiceThread Zoom and Google Classroom
- Weeks 2 through 11:
  - Instructions and discussion of using VoiceThread to learn English via Zoom and Google Classroom
  - Surveys and interviews for participants' experiences with VoiceThread and perceptions about TPACK areas of knowledge
  - Discussion of learning and dealing with any difficulties or problems
- Week 12:
  - Post-treatment surveys and interviews about the preference of VoiceThread and attitudes towards self-studying EFL with VoiceThread via Zoom or Google Classroom

- Perceptions of learners towards TPACK model in learning EFL via online course
- Results and Comparisons

3.4 Data collection and analysis

The Scale for assessing speaking tasks. Aligning with Nakamura's study on Japanese language learning, an EFL testing framework for Japanese learners was suggested by combining Nakamura's construct [40, 41] as in Table 1.

The assessor marked each speech with a 6-point scale rated from 0 to 5 by the rules of the scale for assessing speaking tasks. The participants rated their scales for assessing speaking tasks before and after the course to reveal the learning progress.

The Course Satisfaction Questionnaire (CSQ). The Course Satisfaction Questionnaire (CSQ) is designed and tested by the researchers to collect data from the participants. This scale comprises 14 items and five open questions to assess learners' satisfaction of the 12-week course.

The survey demonstrated a four-factor structure for the 14 items, namely *"pedagogical approach", "course design", "teacher feedback",* and *"peer feedback".* The Cronbach's alpha value of these items was 0.86.

This post-test survey included 14 questions based on a 5-Likert scale answers ranging from strongly agree (5) to strongly disagree (1). Besides, there were five qualitative open questions to explore the participants' perceptions about TPACK activities. The questions focused on the preferences of online vs. classroom-based speaking activities; teacher's feedback vs. peer review; difficulties during the project, and suggestions for the online speaking course.

Table 1. The scale for assessing speaking tasks

Scale for assessing speaking tasks	Explanation
1. Fluency	a. fluency, pronunciation, intonation, speed, natural/ quick response, pause, timing
2. Vocabulary	b. vocabulary, accuracy
3. Grammar	c. grammar, accuracy
4. Attitude	d. attitude, loud/clear voice, eye contact, active participation, gesture/body-language, cooperation, participation, feeling, expression, delivery,
5. Comprehension	e. comprehension, organization, ask and answer properly, appropriateness, persuasion, clarity, engaged listening, quantity, content, accuracy, communication ability, function, clear the task, understanding the question, discourse competence, dialectic, having cultural background and knowledge

4 Findings and discussion

4.1 Improvement in English speaking progress with online learning using VoiceThread

This section aims at answering the first research question, which is about the improvement of learner participants in the course. Pre-treat and post-treat surveys were delivered to the participant to examine the learning progress and satisfaction with the course. Figure 3 shows the comparison of the learners' states before and after the course with using VoiceThread on Zoom and Google Classroom.
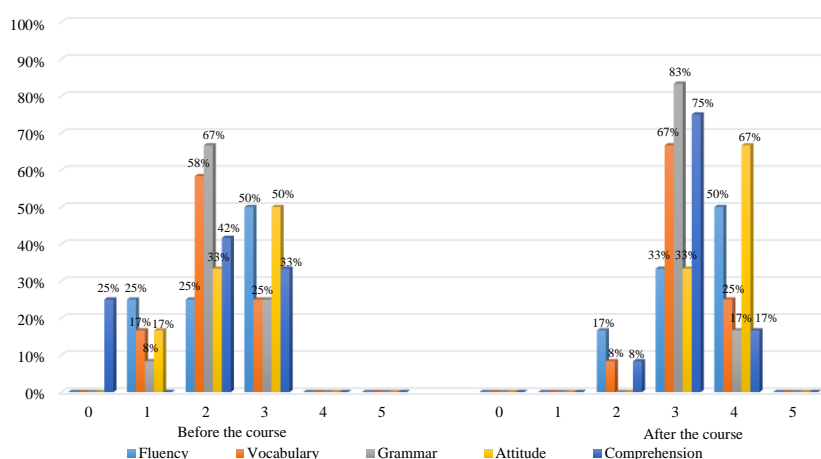

Fig. 3. Comparison between before and after the online course design

Figure 3 depicts the difference of rating scores in 5 speaking competences suggested from Nakamura's structure for Japanese learners [40, 41] before and after the course with using VoiceThread to self-study EFL of Japanese students. The results based on a 5-Likert scale to assess the levels of speaking competence, including fluency, vocabulary, grammar, attitude and comprehension. The ratings were interpreted as shown in Table 2.

Table 2. Interpretation of 5-Likert rating scale

Items	Ratings	Interpretation
0	Very Low	Not able understand and speak English at all
1	Low	Rarely understand English but not able to speak English
2	Moderate	Rarely understand English and rarely speak English
3	Average	Able to understand English and speak English
4	High	Understand and speak English well
5	Very high	Understand and speak advanced English well

In this context, the learners gained a certain improvement in all 5 areas of the speaking competences after 12 weeks studying EFL with VoiceThread via Zoom and Google Classroom. Grammar was significantly improved with 83% of the participants rated Average and 75% of the learners did the same on Comprehension. There was no students confidently rated their speaking competence 4 or 5 as high or very high levels before the course. It was witnessed a positive change after the course with 67% and 50% learners enhancing their attitude and fluency respectively. The participants rated their scores of 5-dimensional competence between 0 and 3 in pre-treatment tests with the majority of 2 (moderate) and 3 (average). More interestingly, there were no students rating as Very low (0) or Low (1) after the course. The ratio fell into level 3 (average) and 4 (high) as a positive result. Figure 3 depicts the percentages of scores the learners rated in detail according to 5-dimensional competences. A clear description of improvement between before and after using VoiceThread in learning EFL among Japanese learners was witnessed.

Besides, the result also revealed several supportive functions of LMS on the aspects of content repository and engagement for low-stake activities [19]. In the context of non-native EFL teaching and learning, VoiceThread is a Web 2.0 tool, which has been widely used. However, there has no previous research to consider VoiceThread as an instrument to assist EFL learning under the TPACK dimensions. With good learning design, Zoom was used as the mobile learning platform which could enhance the learners' self-belief in learning achievement and enhance learners' autonomy [36]. In addition, students' attitudes toward ICT integration to online learning are influenced by the learning environment. The students who can utilize information technology well will be able to reinforce their motivation and self-confidence in the outcome performance [26].

Overall, the results confirm that VoiceThread is a handy tool for enhancing non-native students' English learning skills, which makes contribution to learners' autonomy. VoiceThread is a helpful tool to enhance oral production skills because the students can see and listen to their presentations for the sake of self-practices and rehearsals. Various studies reported that stress and anxiety hinder a person from expressing the thoughts clearly and accurately. The opportunities to rehearse and deliver speeches in the absence of a physical audience can reduce stress and anxiety [32].

Apart from the necessary role of teachers for direct feedback, learners' mutual feedback is also a significant factor for collaboration and peer reviews' improvement. It was aligned with the previous study on the same area of online communication tool [19, 20]. Thus, the teacher cannot solely rely on VoiceThread for students' speaking activities. The teacher should plan all learning activities and assignments with other resources and learning modes for oral presentations. Students may consider using technological tools to increase the learning attitudes and independence in learning foreign languages. This result corroborates Negash and Powell's works and other previous studies on the effects of VoiceThread on students' learning [42].

4.2 Perceptions about TPACK areas of knowledge in the online course design

In order to answer research question 2, how the student participants perceived TPACK areas of knowledge in the online course designed within 12 weeks will be discussed in this section. The TPACK questionnaire was designed to determine non-native English learners' competence in learning English speaking through VoiceThread tool based on Mishra and Koehler's framework. To deal with the second research question, Table 3 summarizes the *model dimension, objectives, teaching strategy, and content* of the TPACK model speaking course.

Zoom Online meetings were held as the main platform to conduct the pilot course with VoiceThread tool. Google Classroom was applied to maintain the stream of classes with announcements and VoiceThread links uploaded.

The intervention (Table 3) was designed based on 6 areas of TPACK model and the learner participants' requirements for ICT in learning English. In terms of learners' perceptions about this TPACK speaking course, three issues were raised from the qualitative data, they are: (1) *the learners perceived a positive attitude* towards the technology design of English speaking online lessons; (2) *the learners preferred the teachers' feedback* with pedagogical comments and reviews to their peers'; (3) however, the *learners' English proficiency did not meet the teacher's expectation* after the course despite a slight improvement in the overall assessment. This section aims to answer the second research question, which is to find out the learners' perceptions about TPACK model in learning EFL online.

Table 3. TPACK intervention in online course design

Model dimension	Technology (T)	Pedagogy (P)	Content (C)	Technological Pedagogy (TP)	Technological Content (TC)	Pedagogical Content (PC)	TPACK
Adapted dimension	ICT knowledge and VoiceThread under-standing	Pedagogical knowledge	English Knowledge	ICT pedagogical knowledge	ICT English Knowledge	Pedagogical English Knowledge	ICT pedagogical and English knowledge
Teaching strategy	Information and Communication Technology (ICT)	Language teaching approach	English Speaking Skills	Online collaborative learning	Online English Speaking Learning	Revising and editing the English assignments Peer reviews and collaborative activities	TPACK Model course
Objectives	To get used to ICT techniques in learning	To consider and practice speaking English as a process of brainstorming and delivering	To help learners develop a concrete and logical speech of English	To learn ICT and collaboration skills together	To learn English speaking skills online	To equip learners with extra learning skills, and content knowledge acquisition	To integrate all above strategies

		learners' thoughts into words.					
Content	Computers or mobile devices are used as means of communication and media. VoiceThread, Zoom and Google Classroom are platforms used for the interactive teaching and learning activities.	Students participated in a 15-week course learning English speaking skills under the instruction of the teacher and peer feedback and collaboration.	The teacher provides the participants with content instruction along with learners' proficiency level.	Zoom, Google Classroom and VoiceThread are cooperated into teaching and learning process	Presentations and discussions were conducted online directly via Zoom meetings.	The teacher blended two modes of indirect feedback on VoiceThread and direct feedback (fluency, attitude) at the Zoom meetings.	Teacher provided students with TPACK knowledge and VoiceThread via online learning environment.

In order to clarify the understanding about rating scores, Table 4 gives a description of the scores ranges and interpretation respectively. The participants were asked to rate the levels of agreement with the TPACK areas of knowledge survey, ranging from strong disagree (1) to strong agree (5). In that order, the interpretation of the score ranges about TPACK model perception was provided from very low (1) to very high (5). The score ranges were reported by the participants' responses to the ratings from the questionnaire surveys.

Table 4. Five-point Likert scale interpretation (TPACK areas of knowledge)

Items	Ratings	Score ranges	Interpretation
1	Strongly Disagree	1.0 - 1.80	Very low
2	Disagree	1.81 - 2.83	Low
3	Moderate	2.84 - 3.50	Average
4	Agree	3.51 - 4.00	High
5	Strongly Agree	4.01 - 5.00	Very high

In align with the description in Table 4, Table 5 further explains the interpretation due to the average (X) and Standard Deviation (SD) scores calculated by R-studio statistical software. According to the descriptive statistics Table 4, the Mean and Standard Deviation (SD) reinforced the results from the questionnaires for higher reliability on the agreement level on the use of TPACK model to design the intervention with VoiceThread. The data for calculation were collected from the course satisfactory questionnaires (CSQ) delivered in post-treatment phase. As can be seen from Table 5, the descriptive statistics shows a mean variance ranging from 2.77 to 3.60 with overall average score of 3.41. Learners responded an average satisfaction to the application of TPACK model into the learning speaking skill process. Moreover, the

standard deviation overall is 2.11 showing a consistency in the responses and thus, the internal consistency is adequate.

Table 5. Statistical description of TPACK area knowledge questionnaire

Items	Average (X)	SD	Interpretation
TK	3.60	1.79	High
CK	2.77	1.74	Low
PK	3.33	2.92	Average
PCK	3.00	2.83	Average
TCK	3.00	2.83	Average
TPK	4.00	2.24	High
Overall	3.41	2.11	Average

Together with CSQ, recordings from interviews were transcribed for further conclusions. For those held positive perceptions about technology's role in EFL speaking, their reasons included:

"I found it very convenient to have the ability to easily share each other's speaking and manuscripts."

Another student reported that *"Via Zoom, it is easier to share presentations and manuscripts and evaluate the members' presentations. Besides, each learner's presentations will also be evaluated by the other members, which will increase learning motivation."*

Student 3*: "I prefer online. The reason is that I am not as nervous as when I make a face-to-face presentation that I can receive it wherever I like."*

Student 4: *"I can look up the online dictionary whenever I lack vocabulary and need various new words. It is more efficient and save more time than paper dictionary."*

However, one participant answered that due to the lack of English proficiency that they were not able to follow the teacher's instructions. Online learning caused obstacles to non-native learners in terms of instructional languages and speaking interaction. Plus, the perception is consistent with the previous research that learners with lower linguistic competence prefer direct feedback and corrections from teachers rather than peers' review [43, 44].

The participant commented that *"the teacher gains more experienced with direct comments and points out my errors for correction. It is more acceptable".*

The overall results of Table 3 and 4 on TPACK intervention are clear indications that most students acquire basic knowledge about all dimensions of TPACK and use VoiceThread as a handy tool for enhancing the language proficiency. The findings indicate that the Japanese learners possessed the learning skills for using VoiceThread in online classes. According to the answers to TPACK areas of knowledge, the students revealed a high level of agreement to VoiceThread as learning instrument, Zoom and Google Classroom as online learning platforms (X=3.41). This result is consistent with previous study on which technology was blended into English instructions to produce highly positive TPACK areas of knowledge that led to highly posi-

tive attitudes [45, 46]. Additionally, the TPACK framework has the potential to improve EFL teachers' performance by integrating technology into the teaching process to reinforce relationships among subject matters, teaching methods, and technology [45].

5 Conclusion and future research

Driven by the desire to understand non-native learners' understanding and attitudes towards ICT integration into learning EFL, the study serves as a platform for the students to experience VoiceThread under TPACK model. This study presented empirical evidence that VoiceThread can be a useful learning tool in enhancing students' English speaking proficiency. When being taught the speaking skills in online environment with the support of interactive Zoom and Google Classroom platforms, non-native learners' speaking performances were enhanced with greater motivation and concentration. Responses to TPACK intervention questionnaire indicated that the respondents possessed high competency levels for almost all areas of knowledge, including TK, CK, PK, PCK, TCK, TPK, and TPACK.

To accomplish an effective learning environment, it is advisable for teachers and students to be well-equipped and trained with educational technology readily available. Continuous professional development and a learning community for teachers can ensure the teaching skills to remain applicable to their learners in accordance with learning styles, motivations, and interests. Using VoiceThread enables students to assess their works in a more meaningful and exiting way, become better aware of their work quality and collaborate for peer reviews better.

The research reinforces the application of educational technologies into learning English among non-native learners in Japan. Besides, the participants in the research belonged to engineering educational settings, where English is desired to assist their academic training process. Furthermore, learning how to use new forms of technology is essential because it encourages learners to innovate and to transfer knowledge effectively through the knowledge and skills acquired. The significance of high preference for the integration of mobile devices revealed positive potentials for the use of mobile devices as an assistance to study and enhance language skills outside of the classroom. Hence, the propensity of engineering students to use technologies could be emphasized according to the connection between language learning and engineering education. In particular, technologies or digital platforms are increasingly available for language teaching and learning processes.

A potential limitation of this study is the small size of participants with 12 students and one teacher. Larger sample sizes of participants involved in future research may elucidate more data on VoiceThread's influences in teaching and learning language skills. Given the limitation of this study, providing a groundbreaking finding in various learning management systems in foreign language acquisition certainly draws more attention for future research. Research into ICT tools with various online learning platforms are encouraged to investigate into different dimensional areas of TPACK model on EFL aspects.

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