白板動畫應用在英語學術口語表達與
降低公眾演說焦慮

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摘要

　　學生使用線上媒體工具來製作高品質作業的情形越來越多，也因此高等教育必須發展出一套比較活潑的教學方式與教學計畫來符合學生與職場的需求。然而，學生主要還是使用文字頁面來做英文口語表達，而現行的工商習慣也越來越習慣使用多媒體來溝通彼此的理念。公眾演說焦慮（public speaking anxiety/PSA）是很多學生都會有的問題，尤其在亞洲國家像是台灣。為了幫助學生、探究公眾演說焦慮、並找出焦慮的原因，我們使用白板動畫 (WBA) 軟體設計了一個單組準實驗研究。

　　此研究，共有 16 名學生在 16 週內參與此計畫，並做了三次白板動畫（WBA） 演說，用以檢視演說時語言的進步還有技巧，以及是否能做出有說服力的結論。第一次白板動畫演說為前測，第二次是計劃執行中，第三次為後測。還有一份問券，會調查計畫的前期及後期來檢視學生的公眾演說焦慮（PSA），隨後的焦點小組訪談探討了學生對白板動畫（WBA） 軟體應用在他們演說時的看法，是否降低他們的公眾演說焦慮 (PSA)。為了更細緻的了解學生如何設計他們的演說並與科技結

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合，我們採用了一個複雜動態系統方法，其中包含用於模式的定量數據、針對個別差異的訪談和追溯定性建模（Retrodictive Qualitative Modelling）。結果顯示，口語表達的品質顯著提高，且公眾演說焦慮（PSA）明顯降低。訪談顯示，學生對白板動畫（WBA）持肯定態度，課程也幫助學生提升多媒體溝通技巧。學生反而是在適應白板動畫（WBA）的軟體、網路連線問題和自我管理方面遇到問題。此研究結果將使英語學習者和教授學術口語表達的教師受益，也讓得面對學生有公眾演說焦慮的教師們對這個議題有興趣，並為利用多模態溝通方式的語言學習研究提供支持論點。

關鍵字：　學術英語，口語表達，多媒體，公眾演說焦慮、白板動畫

Whiteboard Animations for English Academic Oral Presentations and Reducing Public Speaking Anxiety

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Abstract

Students are increasingly using online media tools to produce high-quality work, which has created a demand for more engaging instruction and projects to meet student and workplace needs. However, although slides with text still dominate student English oral presentations, business and entertainment services are using more multimedia to communicate ideas and sell products. Furthermore, public speaking anxiety (PSA) is a problem for many students, especially in Asian countries, such as Taiwan. To assist students with presentations, investigate PSA, and explore how technology can help, we designed a single-group quasi-experimental study with whiteboard animation (WBA) software.

A total of 16 students participated, producing three WBA presentations over 16 weeks. These were used to measure their gains in oral presentation language and skills. The first WBA presentation was a pre-test, the second was a practice session and the third was the post-test. A pre-and post-questionnaire measured PSA, and follow-up focus-group interviews probed students' perceptions towards the WBA software. A Complex Dynamic Systems

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approach with quantitative data for patterns, interviews for individual differences, and Retrodictive Qualitative Modelling was adopted to gain an understanding of the many variables in WBA for presentations. The results indicated that there was a significant increase in oral presentation quality and a significant decrease in PSA. The interviews revealed that students held positive views towards WBA, and the course helped students develop multimedia communication skills. However, students experienced problems using the WBA software, internet connectivity issues, and self-regulation difficulties The findings will benefit English learners and instructors teaching academic oral presentations, be of interest to instructors dealing with PSA, and provide support for research into multimodal communication for language learners.

Keywords: English for academic purposes, oral presentations, multimedia, public speaking anxiety, whiteboard animations

1. Introduction

Students throughout the world are using a variety of online media and devices for learning and producing work. This has created a demand for more engaging instruction and projects (Bulut, Ulu, & Kan, 2015), and has led to the development of new multimedia learning material, leaner-generated media (Reyna & Meier, 2018), multiliteracy instruction (Yeh & Tseng, 2020), mobile assisted language learning (MALL) and ubiquitous learning (Lin, Liu, & Chen, 2020) in second language (L2) education. In higher education, academic oral presentations (OP) are dominated by PowerPoint slides with heavy use of text (Leontjev & deBoer, 2020; Morell, 2017). In addition, public speaking anxiety (PSA) is a problem for many undergraduate students (Tsang, 2020). Due to these problems, different technologies need to be explored to help students develop OP skills, perform OPs, and help reduce PSA.

In education, Mayer's cognitive theory of multimedia learning (2021) has demonstrated how multimedia can assist learning provided certain guidelines are followed. There has also been considerable research into multimedia and oral presentations (OP) in Taiwan over the past five years. For example, research into comprehending multimodal texts (Huang, 2017), multimodal communication in augmented reality (Yeh & Tseng, 2020), multimodal video development (Yeh, 2018), and multimodal presentation slides (Hung, Chiu, & Yeh, 2013). There has also been research into flipped learning for oral communication (Lin & Hwang, 2018), blended learning for oral presentation skills (Barrett & Liu, 2019), collaborative learning for OP skills with a mobile app (Barrett, Liu, & Wang, 2021), and a series of studies into PSA and oral presentations (Kelsen, 2019; Kelsen & Liang, 2019; Liang & Kelsen, 2018). However, none of these studies have investigated the impact of technology in helping students reduce psychological factors such as PSA. Therefore, the goal of this study is to design and assess a presentation course for English undergraduate students, and investigate the affordances of student-

generated whiteboard animations (WBA) for developing oral presentation skills and for helping reduce PSA.

The ability to communicate clearly and concisely in an informative manner is often a requirement in international settings (Jurado, 2019). However, some have noted that students still graduate with poor English presentation skills which places them at a disadvantage when applying for jobs (Boetje & van Ginkel, 2020). Reasons for poor presentation skills include students emphasising facts over delivery (Barrett & Liu, 2019), lack of instruction, or PSA (Liang & Kelsen, 2018). This situation may be aggravated due to a lack of practice (Belboukhaddaoui & van Ginkel, 2019), limited skills, or low self-efficacy (Tsang, 2020). While reasons for OP problems continue to be researched, there has been little research into alternative presentation formats to improve oral presentation skills and help students lower PSA. WBA, which can blend presentation dialogue with animations has the potential to help students create informative, entertaining presentations.

In order to assist students with developing oral presentation and multimedia skills, and help students reduce presentation anxiety, this research will help develop WBAs to instruct students in presentation skills, train students to develop WBA presentations and investigate the impact of these measures on PSA. The results will provide researchers and instructors with insights into the affordances of WBA for instruction and presenting, and the results will also show a new approach to help lower PSA. Finally, language departments can use the findings to introduce new instructional approaches and integrate new presentation technology into the classroom.

2. Literature Review

Mayer's cognitive theory of multimedia learning (2005, 2021) describes how students construct knowledge using both words and pictures based on empirical research into how the human mind works. Since the cognitive

capacity of the different memory channels is limited, the aim of multimedia design is to reduce extraneous material and keep the essential message in the form of words and pictures. Learners are able to make connections between the verbal and visual representations in the multimedia model which has been shown to result in higher levels of learning. Therefore, simple designs with keywords are preferred for multimedia learning. For many learning situations, written words and pictures accompanied by narration are regarded as extraneous as they cause increased cognitive processing when the visual learning channel is overloaded. However, this is not the case for second language learners as onscreen text in addition to narration gives learners more time to understand the material (Lee & Mayer, 2018).

2.1 White Board Animations (WBA)

WBA is digital media that can be developed by instructors or learners and is becoming increasingly popular in education (Bradford & Bharadwaj, 2015; Li, Lai, & Szeto, 2019; Reyna & Meier, 2018; Türkay, 2016; Türkay & Moulton, 2016). It uses pictures or animation on a slide background which resembles a whiteboard. WBAs can be used with or without prerecorded narration to dynamically explain abstract or complex ideas, especially scientific concepts, in an entertaining way (Li et al., 2019; Türkay, 2016). Animations in education have been shown to entertain and attract viewers, and have been shown to promote more learning gains (Türkay & Moulton, 2016) in comparison with traditional methods such as PowerPoint, handouts, and written notes. Producing storyboard animations is known as Learner-Generated Digital Media, which is used by educators to help students develop digital artefacts (Reyna & Meier, 2018).

There has only been a small amount of research interest in WBA over the past 10 years because the software was expensive, and the animations time-consuming to develop. Recently, the software has been more affordable or free, and the time needed to produce the animations has been reduced (Suhroh,

Cahyono, & Astuti, 2020; Türkay, 2016) so the technology can now be adopted in this study. Early research into WBA focused on researcher-developed material for receptive skills such as reading (Karthigesu & Mohamad, 2020), social science lectures (Türkay & Moulton, 2016), advanced physics (Türkay, 2016), and indigenous cultural storytelling (Bradford & Bharadwaj, 2015). These studies showed positive results in terms of knowledge retention, motivation, engagement, and enjoyment. For example, Suhroh et al.(2020) found that students, taught English presentation skills by WBA, outperformed the students taught by conventional classroom methods. Students can learn multimedia and research skills from learner-generated digital media such as creativity, communication, and multimedia design, and they can also acquire research skills such as critically evaluating online information, and summarizing the data for animation (Reyna & Meier, 2018).

Türkay (2016) believes there is a lack of experimental evidence on the effectiveness of WBA over more traditional methods or other technologies in terms of learning and motivation. Others have claimed learning with WBA fosters more engagement (Bradford & Bharadwaj, 2015), more self-efficacy, more goal orientation (Reyna & Meier, 2018), and reduces learning anxiety (Karthigesu & Mohamad, 2020; Reyna & Meier, 2018), but the field still lacks empirical evidence to support these claims. The aim of this paper is to provide empirical evidence to show the benefits of WBA production for academic OPs and to investigate if students who develop and perform WBA presentations have reduced public speaking anxiety.

2.2 Academic Oral Presentations

Many university graduates still lack OP skills despite the importance of these skills in the professional workplace (Barrett, Liu, & Wang, 2020; Belboukhaddaoui & van Ginkel, 2019; Boetje & van Ginkel, 2020; Chan, 2011; Smith & Sodano, 2011). As OPs mix knowledge, skills, self-expression, persuasion, and performance, they are perceived as difficult by English

language learners (De Grez, Valcke, & Roozen, 2009). In comparison with academic writing, academic OPs have more direct, spoken-like discourse structures, less academic forms, and more audience interaction (Hood & Foley, 2005; Rowley-Jolivet & Carter-Thomas, 2005; Zareva, 2009).

English learners often place greater focus on content rather than delivery, resulting in fact-loaded OPs which can have a negative impact on an audience (Barrett & Liu, 2019; Chou, 2011). It is well known that extra OP practice is correlated with improvements in OPs for language learners (Amirian & Tavakoli, 2016; Barrett & Liu, 2019; Chou, 2011; De Grez et al., 2009; De Grez, Valcke, & Roozen, 2012; van Ginkel et al., 2020). Although instructors are aware that presentations require both language and paralinguistic skills, they often lack the time and resources to commit themselves to classroom OP practice and feedback, so students are often expected to practice outside the classroom (van Ginkel et al., 2020). To assist instructors, van Ginkel et al., (2015) developed guidelines and pedagogical principles for OPs such as ample opportunities for observed practice, and feedback with self-assessment. Despite these guidelines, Tsang (2020) pointed out that many instructors are unaware which skills contribute the most to successful presentations. Tsang (2020) suggested that instructors should list the skills their learners need, and this list can be simplified based on their students' abilities.

2.3 Multimodal Instruction

Multimodal resources are tools which lower ability language learners can exploit to strengthen OPs (Barrett & Liu, 2016) as increasing communicative competence should be an instructor's primary goal. Tools such as multimedia, images, and graphics (Morell, 2017) reinforce this goal as visual elements help structure an OP, provide the audience with meaning, and convey extra information (Beltran-Planques & Querol-Julian, 2018). Successful presenters use visuals in a syncretic way to complement the linguistic content (Anesa, 2019; Kress, 2010; Rowley-Jolivet, 2002). For example, Hung, Chiu, and Yeh

(2018) demonstrated how students trained in multimodal awareness showed an increased awareness of how to apply multimodal resources to presentations and this resulted in OP improvements.

The types of technology that have been implemented to assist L2 learners with OP practice includes digital video or audio for fluency practice (Gromik, 2012; Hsu, Wang, & Comac, 2008; Huang & Hung, 2010; Sun, 2009), and reflection (Hsu et al., 2008; Hung, 2011), multimedia courseware (Hill & Storey, 2003; Tsai, 2011), online feedback (De Grez, et al., 2012), flipped mobile learning (Lin & Hwang, 2018), blended learning (Barrett & Liu, 2019), and a mobile app for OPs (Barrett et al., 2020, 2021). Flipped instruction was found to motivate and encourage higher-level learners to interact more, but lower ability learners still need training in online interaction (Barrett & Liu, 2019; Lin & Hwang, 2018).

Despite the growing awareness that communication is the most important aspect of L2 speaking (Bulut et al., 2015; Canagarajah, 2018; Huang, 2017; Leontjev, & deBoer, 2020; Yeh, 2018; Yeh & Tseng, 2020; Yi & Angay-Crowder, 2017), L2 instruction and the evaluation of spoken discourse still focuses on linguistic features, and students are praised or blamed on their use of verbal resources (Canagarajah, 2018) without acknowledging the full range of semiotic resources used by speakers when presenting (Canagarajah, 2018; Yi & Angay-Crowder, 2017). Kress, Jewitt, Ogborn, and Tsatsarelis (2014) explained how visual images such as advertisements, posters, or presentations combine images with writing to provide powerful communicative functions in given contexts. The growth of internet and mobile technology has led to the growth in the use of multimodal messaging which has different features to written text and images (Bulut et al., 2015; Lim & Tan, 2017). In inter-language communication on online platforms such as YouTube, Facebook, and Twitter, spoken language is used alongside other semiotic resources such as voice, gesture, gaze, and visual devices to ensure communication (Beltran-

Planques, & Querol-Julian, 2018). In fact, only focusing on the linguistic content can limit the teaching of communication to L2 learners as they need to be aware of the full range of semiotic researchers available (Yi & Angay-Crowder, 2017). The multimedia affordances of WBA software can allow learners to utilize more semiotic resources.

EFL learners are becoming more aware of how to use multimodal tools to communicate meaning (Yeh, 2018). For example, students used visuals to show complex information, draw viewers' attention, and engage the audience (Yeh & Tseng, 2020). Students have also been shown to use multimedia to support both content and linguistic meaning in school science classes (Leontjev, & deBoer, 2020). Huang (2017) found that students are able to engage with and critically examine the content by focusing on the multimodal elements of the text in a study into multimodal moving image text.

2.4 Public Speaking Anxiety

Public speaking anxiety (PSA) is a common fear for many people in social situations and can cause difficulties for oral presentations (Boetje & van Ginkel, 2020; Richmond & McCroskey, 1997). Students with PSA believe they lack the ability to perform in front of an audience so they often avoid preparing for an OP. This lack of preparation can impact the quality of the presentation (Bodie, 2010; Boetje & van Ginkel, 2020; Kelsen, 2019; Tsang, 2020). Although PSA is a problem for language learners, it can be reduced with practice. Language learners with PSA find OPs even more challenging due to added communication difficulties (Kelsen, 2019; Liang & Kelsen, 2018; Mak, 2011) but it is believed PSA can be reduced through practice (Boetje & van Ginkel, 2020; Kim, Kogan, Bellini, & Shea, 2005; Rubin, Rubin, & Jordan, 1997; van Ginkel et al., 2015). Tsang (2020) found that the relationship between practice and anxiety was non-significant and self-efficacy, or self-confidence in presentation skills is seen as a major factor in reducing PSA (Boetje & van Ginkel, 2020; Bolívar-Cruz, Verano-Tacoronte, & Galván-

Sánchez, 2018; Tsang, 2020). Bandura (1997) states that self-efficacy is the self-perceived competence that a task can be completed, and strong self-efficacy is needed to reduce anxiety. As such, instructors need to focus on positive feedback, the development of effective study skills, and student support (Tsang, 2020). Although individual differences such as confidence, neuroticism, and introversion are predictors of anxiety levels, project work and skill development can help lower anxiety (Liang & Kelsen, 2018). This supports the argument that developing presentation skills is a very effective method for helping students lower PSA.

Due to advances in technology, WBA software is now available for all students. Multimedia can help language learners communicate more effectively if it provides extra information and can engage learners by compensating for linguistic limitations or by using different memory channels (Mayer, 2021). However, research into how WBA improves English learner's oral presentations in tertiary education, and the problems they experience is still limited. Furthermore, the development of oral presentation projects has been shown to increase self-efficacy, and an increase in self-efficacy has been linked with lower levels of anxiety. In order to understand the impact of WBA presentations developed by English language learners, and provide further evidence that presentation project work can lower public speaking anxiety, this paper asks the following questions.

Research questions

1.   Do whiteboard animations improve the quality of English learners' oral presentations?

2.   Does training and presenting with whiteboard animations reduce public speaking anxiety?

3.   What are the dynamic elements that attract and repel language learners using WBA for learning and presentations?

3. Methods

To the best of our knowledge, this research is the first such study to investigate WBA presentations in terms of oral presentation skills and the effects of this technology on public speaking anxiety. As such, this paper drew on research into both learner-generated digital media (Reyna & Meier, 2018), and multiliteracy in language teaching (Bulut et al., 2015; Canagarajah, 2018; Huang, 2017; Leontjev, & deBoer, 2020; Yeh, 2018; Yeh & Tseng, 2020; Yi & Angay-Crowder, 2017). The instructor developed WBA videos to teach OP skills over one semester, and students developed WBA presentations over 16 weeks in the following semester. The first student WBA presentation was a pretest, followed by a practice presentation, and a WBA post-test final presentation. The students took the Personal Report of Public Speaking Anxiety (PRPSA) questionnaire before the first presentation and before the final presentation.

3.1 WBA

The WBA software adopted in this research is called Moovly https://www.moovly.com. It is free to use and has over one million media objects. The WBA videos can be created and stored in Flip, the class Learner management system. The animations can be viewed on mobile devices or PCs as Flip has both iPhone Operating System (iOS) and Android platforms. Figure 1 is a screenshot of a Moovly WBA.

Figure 1. Screenshot of WBA.

3.2 Learning Material

The WBA instruction videos on OP development followed guidelines by Thon, Kitterman, and Italiano (2013) who suggest the animations should be clear and concise with simple drawings accompanied by brief explanations. The explanations should contain metaphors and everyday concepts to make them more accessible for students (Türkay, 2016). The learning material is based on common oral presentation features (Barrett et al. 2020; Harrington & LeBeau, 2009; Wallwork, 2010) and includes, the introduction, main body,

conclusion, slide design, useful phrases and frequently used vocabulary, body language, and the purpose of each section. Each section of a presentation (introduction, body, conclusion, slide design, and body language) was introduced by a WBA video of 3-4 minutes in length. Each week, a new WBA animation was introduced in the classroom, and students were asked to watch the animation again in their own time and discuss the content with classmates. The WBA animations were followed by classroom reflection questions and an online quiz in Google Forms.

A one-semester single-group quasi-experimental study at a university in Taiwan was undertaken to assess if students using WBA produced better quality presentations and if training and presenting with WBA helped lower PSA. The students were 16 undergraduate and graduate students from three intact classes studying English for academic purposes with an English level of B1 to B2. Before the course, all the students were informed of the contents of the study and asked to sign a consent form. Students were given the option to present online or face-to-face due to Covid 19 concerns during the final presentation. The study used pre- and post-assessments with an oral presentation rubric in addition to the PRPSA Likert scale questionnaire (Appendix 2). Furthermore, interviews were used to help the research team evaluate WBAs for English academic presentations. Figure 2 shows the design procedure.
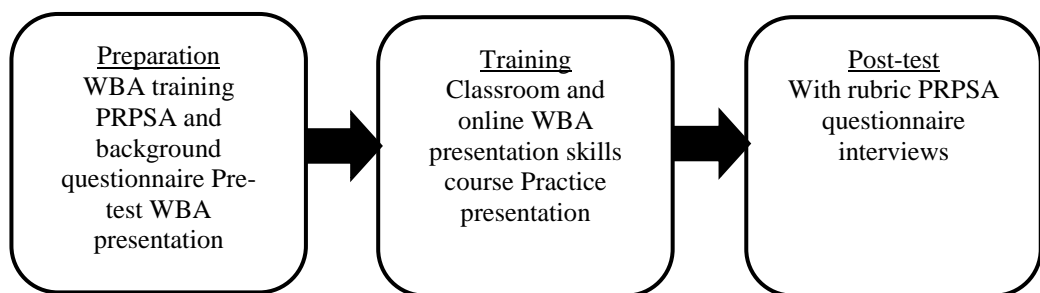

Figure 2. Design procedure of this study.

3.3 Instruments

A holistic oral presentation rubric was used for the WBA presentations. The rationale for the rubric was because most analytical rubrics focused on linguistic and presentation skills which did not cover the animated, design features of the WBA presentations. Training with practice sections was given to four interraters using guidelines developed by Hughes (2003).

The PRPSA questionnaire, developed by McCroskey (1970), measures public speaking anxiety on a 34-item 5-point Likert scale and has been used in foreign language settings (Kelsen, 2019). The questionnaire was translated into the students' first language, Mandarin Chinese, and then checked for consistency by native Chinese-speaking language education experts. Before the questionnaire was administered, it was checked for reliability using Cronbach's Alpha. The reliability of the 34-item survey measured by Cronbach's alpha was high (α=.890).

The interview process consisted of three 30-minute focus group interviews. Three interviews were conducted with all the students from each of the three intact classes. Class One had five students, class two had five students, and class 3 had six students. All of the students had agreed to participate in the interview by signing a consent form, and they could opt out of the interviews if they no longer wished to participate.

Focus group interviews were used to ensure all the participants could attend and small focus groups can show both individual and collective issues (Dörnyei, 2011). The students answered semi-structured interview questions after the final presentation online or face-to-face depending on their preference due to covid 19. The topics included their thoughts on WBA, WBA for learning presentation skills, their oral presentation needs, and additional topics related to OPs. The students and interviewer could expand the topic depending on the flow of the conversation. The interviews were conducted in Mandarin Chinese and English and then translated into English by an assistant.

4. Analysis

Training with practice sections was given to inter raters using guidelines developed by Hughes (2003). Training videos from a pilot session were used after obtaining student permission in order to establish benchmark ranges. The raters could ask for clarification during independent practice, and a discussion session was used to identify any problems. The full rubric can be seen in Appendix 1. The interrater reliability for four evaluators was calculated by the intraclass correlation coefficient (ICC). The ICC results showed a score of .87 which is classified as good reliability (Koo & Li, 2016).

The translated and transcribed interviews were returned to the participants for content approval (Asoodar, Atai, Vaezi, & Marandi, 2014). Following this, the interviews were read for themes and meaningful statements. Several rounds of reading were carried out to confirm and adjust the themes (Bogdan & Biklen, 1998). The researcher identified the positive and negative themes through an inductive process to reduce overlap (Barrett et al., 2021). The final themes represented the attractor and repeller states which motivate or demotivate learners from using WBA for oral presentations.

A three-step process was used to calculate the PRPSA questionnaire scores in accordance with Kelsen (2019). Firstly, questionnaire items 1,2,3,5,9, 10, 13, 14, 19, 20, 21, 22, 23, 25, 27, 28, 29, 30, 31, 32, 33 and 34 were totaled. Secondly, questionnaire items 4, 6, 7, 8, 11, 12, 15, 16, 17, 18, 24 and 26 were totaled. Appendix 2 shows the questions in full. In step 3, the following formula was used: PRPSA = 132-Total step 1 + Total step 2. The score ranges from 34-84 (low anxiety), 85-92 (moderate low anxiety), 93-110 (moderately anxiety), 111-119 (moderately high anxiety) to 120-170 (high anxiety).

Paired-samples *t*-Tests were used to assess the holistic rubric scores for the pre and post-WBA presentation and for the pre-and post-PRPSA questionnaire results. The variables included the rubric scores for the pre-WBA presentation and the post-WBA presentation on oral presentation quality. For

the public speaking anxiety, the variables were the results of the pre-PRPSA and the results of the post-PRPSA.

Dörnyei (2014) introduced a methodology known as retrodictive qualitative modeling (RQM) in order to research the changing environment of dynamic learning systems. RQM is carried out using a mixed-methods approach to identify the many variables in a complex environment (Bambirra, 2016; Dörnyei, 2014). This is done via a three-step process which allows an instructional designer to identify the salient states (Marek & Wu, 2014). In this study, the salient states were the final pre-test scores (presentation ability) and PRPSA score (level of public speaking anxiety). The interviews reveal a deeper understanding of the salient states, and the interview data was analyzed and clustered into themes representing the attractor and repeller states influencing the learning system (Barrett et al., 2021). Figure 3 shows the outline of the RQM procedure.
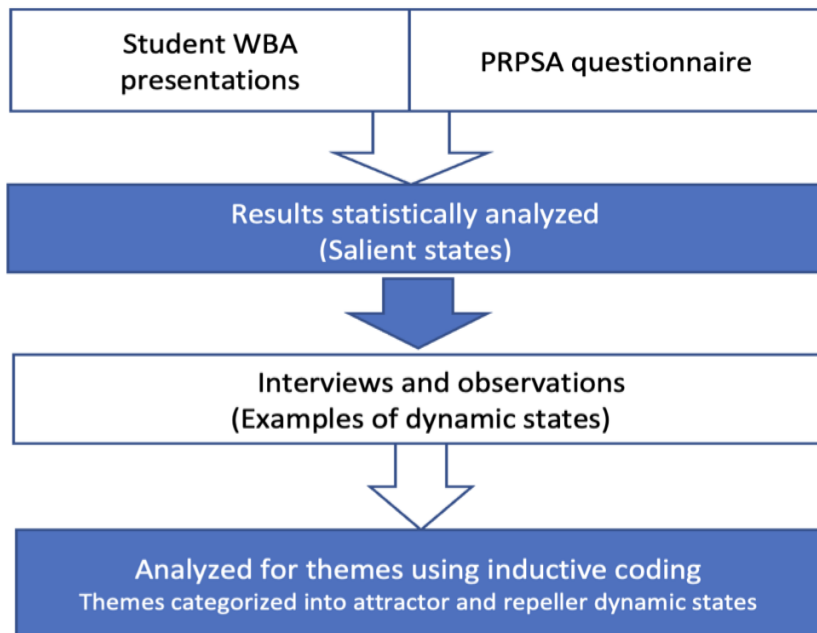

Figure 3. Outline of the RQM procedure based on Dörnyei (2014).

5. Results

The results include the total scores for the pre- and post-WBA presentations, the paired sample *t*-tests for the presentation skills, the PRPSA questionnaire results, *t*-tests for the PRPSA questionnaire, the interview themes, and the RQM analysis.

5.1 WBA Presentation Results

The results of the holistic rubric scores for the participants are presented below in Table 1 in terms of raw scores with 5 as the highest score and 1 as the lowest (see Appendix 1).

Table 1.

Holistic rubric scores

Participant	Pre-presentation rubric score	Post-presentation rubric score
1	2.5	4
2	2.5	3.5
3	3	3.5
4	2	3.5
5	3	4.5
6	3	3.5
7	3	3.5
8	3	4.5
9	2	4
10	2.5	3
11	3.5	4.5
12	3	3.5
13	3	3.5
14	3	3.5
15	3.5	3.5
16	3	2.5

A paired-samples *t*-test was calculated to compare the mean pretest presentation score to the mean final presentation score. The mean of the pre-test was 2.8438 (*sd* = .436), and the mean of the post-test was 3.6563 (*sd* = .539). A significant increase from the pre-test to the final was found ($t(16)$ = -4.961, $p<.05$). This shows that the students improved in terms of presentation skills over the 16 weeks.

5.2 PRPSA Questionnaire Scores

The results of the PRPSA questionnaires in terms of total scores are presented below in Table 2 for only 15 participants as one questionnaire was incomplete. In the PRPSA questionnaire, a lower score indicates less anxiety.

Table 2

Results of the PRPSA questionnaire

Participant	Pre-PRPSA questionnaire score	Post-PRPSA questionnaire score
1	93	83
2	128	105
3	140	124
4	123	141
5	166	123
6	115	120
7	127	132
8	94	92
9	116	100
10	122	99
11	144	110
12	134	124
13	94	90
14	120	91
15	128	108

A paired-samples t-test was calculated to compare the pre-test mean PRPSA to the mean post-test PRPSA score. The mean of the pre-test was 122.933 ($sd = 19.424$), and the mean of the post-test was 109.466 ($sd = 16.949$). A significant decrease from the pre-test to the post-test was found ($t(15) = 4.624$, $p<.05$). This indicates that public speaking anxiety was significantly lowered after over the 16 weeks of WBA training.

Table 3.

Interview results

Theme	Percentage of comments
Benefits of WBA	19.5
Improvements in presentation knowledge	18.5
problems with Moovly platform	22.5
self-regulation issues	10
Presentation anxiety	9.5
Internet issues	8
Training needs	7
Hardware issues	5

Table 3 shows the results of the interview analysis with the findings organized into themes. The most frequent theme is problems with the Moovly platform at 22.5% followed by the benefits of WBA for presentations at 19.5%. The least frequently discussed themes are hardware issues at 5%, and training needs at 7%.

5.3 Positive Comments

The following are comments taken from the student interviews on the positive aspects of learning and using WBA for presentations. In the following extracts, the students are aware of how WBA can motivate students to create presentations. According to Mayer (2021), multimedia learning occurs because

students receive both visual and written input which can lead to increased learning.

Student 3 stated that "It's good, because with the animation, it's more attractive. Aside from listening to the presenter, we can also watch the whiteboard animations". Student 5 stated that "I think it is easy to learn presentation skills by using WBA. Because it is creative and easy for the audience to follow up on what the presentation is about". Finally, student 8 stated that "It will let the audience focus on the presentation, compared to the other presentations, it is livelier and more interesting".

5.4 Negative Comments

The following extracts are students' negative comments about the difficulty of using Moovly to create WBA. As Barrett et al. (2021) noted, if students find a platform difficult to use, they will often reject it at an early stage. Student 2 stated, "Compared to normal presentation methods, WBA is more complicated. It's not easy to do the presentation, because the way of doing it is different from ordinary presentations". Student 6 found that "The time is hard to control, typing is inconvenient, and It takes a long time to upload videos". And student 7 stated that "It takes a long time to upload the video. It takes a long time to export the video. The procedure of downloading is complicated".

6. Retrodictive Qualitative Modeling

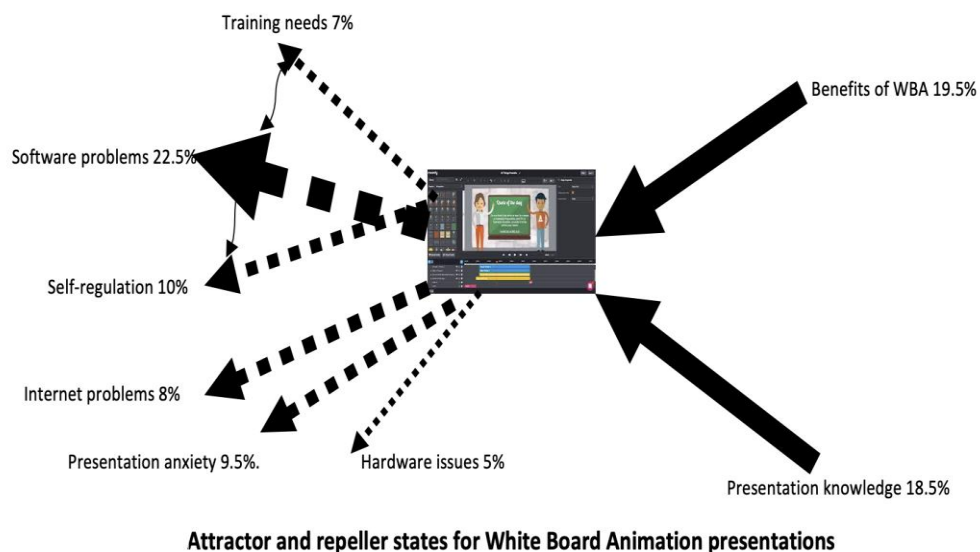**Attractor and repeller states for White Board Animation presentations**

Figure 4. RQM with attractor and repeller states

Figure 4 shows the attractor and repeller states for students using WBA for OPs from a Complex Dynamic Systems perspective (Larsen-Freeman & Cameron, 2008). It can be seen that in the present state of the study, there are more repeller states indicating that designs are needed to strengthen the attractor states. The arrows pointing at the WBA are the attractor states and the width of the arrows is related to the percentage of student comments. The arrows pointing away from the WBA are the repeller states, representing states that need to be revised so that students can utilize the affordances of WBA to make highly effective presentations.

6.1 Discussion

The discussion is divided into three parts based on the three research questions.

1. **Do whiteboard animations improve the quality of English learners' oral presentations?**

The results show that there was a significant improvement in the overall quality of the students' oral presentations from the pre-test to the post-test presentations after training and practicing with WBA. One reason for this might be that the multimedia content makes the presentation more engaging for learning presentation skills and the audience by connecting the visual, in the form of animations, pictures, and diagrams, and the verbal channels, in the form of writing and narration. This is in keeping with Mayer's cognitive theory of cognitive learning (2021) which states that learning is improved when both the visual and verbal channels are engaged. Furthermore, the material has a more powerful communicative function (Kress et al., 2014) by providing more meaning as well as providing more information (Beltran-Planques & Querol-Julian, 2018). It is known that multimedia provides audiences with extra semiotic information in the form of animations and diagrams. This reinforces the message and improves communication which is the ultimate goal of a presentation (Morell, 2017).

The interviews revealed that the students found the WBA more entertaining which results in more engagement with the learning material which can strengthen learning. Students have grown up with online video and social media which has exposed them to authentic English content (Jurkovič, 2019). This has caused a disruption in the traditional way of language learning with different interaction patterns, ways of creating content, and new styles of communication (Hampel, 2019). This change has created a demand for new learning material that can utilize the different communication channels and thus encourage more cognitive engagement with multimedia (Mayer, 2021). Bradford & Bharadwaj also claimed learning with animated whiteboards is more engaging to the audience, and the results show that language learners can appropriate multimedia tools to support meaning (Hung, Chiu, and Yeh, 2018; Yeh, 2018). The increased engagement can also help audiences understand the content of a presentation.

2. Does training and presenting with whiteboard animations reduce public speaking anxiety?

The results of the PRPSA questionnaire show that the participating students had a lower score in the post-test compared to the pre-test after training with and developing WBA. This significantly lower score clearly shows the students had less public speaking anxiety after the training. Training and practice with OP projects can increase students' self-efficacy in terms of OPs (Liang & Kelsen, 2018; Tsang, 2020). Whiteboard animations have been shown to engage and motivate learners to apply multimedia content to the presentation. It is known that multimedia helps with difficulties in linguistic content and can empower students with increased communication skills. This self-awareness of an increased ability can also lower the affective filter (Krashen, 1982) which is a barrier to effective communication in a second language. Bandura (1997) states that strong self-efficacy is needed to reduce anxiety, as students with stronger self-efficacy believe in their own abilities. In other words, an increase in presentation knowledge, extra practice, an awareness of audience engagement with the WBA, and the knowledge that multimedia helps communication can lower anxiety.

3. What are the dynamic elements that attract and repel language learners using WBA for learning and presentations?

By analyzing the results, the attractor and repeller dynamic states were identified as variables that affect WBA for presentations. In terms of attractor states, students were aware of an increase in OP knowledge after the training. These findings are beneficial as they increase students' skills resulting in better oral presentations. In addition, the students were aware of the benefits of WBA animations for OPs. This awareness will allow them to apply their skills to produce better quality, animated presentations in the future, and increase their OP self-efficacy. RQM allows for a deeper understanding of the complex variables that lead to the final outcome by studying factors that influence a

learning environment. In this way, a learning system can be designed to meet learners and instructors needs. The affordances of technology can be a strong attractor state if the technology meets the needs and interests of the students (Liu & Chao, 2018) as students naturally gravitate towards attractor states whilst learning (Larsen-Freeman & Cameron, 2008).

Although the attractor states were mentioned by many students, the total percentage of repeller states was higher, especially for software problems. Repeller states result in learning demotivation (Barrett et al., 2021; Dörnyei & Ushioda, 2011), and in this paper, the repeller states included the perceived difficulties with the Moovly software for developing WBA. Even though instructors are aware of the affordances of a technology, without training and awareness raising, students will see the software as difficult or unhelpful. For example, new technology often has a learning curve, and in addition to training, students need ample practice sessions. The instructor provided training videos and allowed students to practice, but more face-to-face training may have been needed. Other related problems such as a lack of self-regulation, and internet connectivity issues helped construct repeller states. For example, some students reported that they waited until several days before the deadline before working on the final WBA. This led to frustration as they lacked the skills to fluently interact with the software. Furthermore, due to Covid-19 lockdowns, some students experienced internet connectivity problems as Moovly is a web-based platform which requires a strong internet connection. Only by designing to overcome these repeller states can instructors help students take advantage of the affordances of WBA for future presentations. As it stands at the moment, the presence of repeller states means students are reluctant to use WBA software in the future despite the learning gains in terms of presentation quality and lower anxiety.

7. Suggestions

One of the goals of this study is to provide instructors and students with new approaches to OPs. The results show the affordances of WBA for presentation skills and reducing anxiety; however, students expressed reservations regarding the software. It is the author's opinion that WBA software in its present form is unsuitable as a replacement for PowerPoint presentations because of the amount of time it takes to construct animated presentations compared with PowerPoint. However, the technology will become more user-friendly making WBA a viable alternative to traditional OPs in the future.

At this present time, there are two areas in which WBAs can be utilized in the classroom. The first is part of a larger, creative project where students have time to develop animated presentations over the course of a semester. The second is to embed elements of WBA into regular presentations which can help improve the quality of an OP in addition to helping students work with new forms of multimedia technology.

8. Limitations

The main limitation of this preliminary study is that it was a single-group quasi-experimental study. The presence of a control group using traditional presentation training and PowerPoint presentations would strengthen the findings as quasi-experimental two-group studies have more statistical power.

Secondly, this research paper only analyzed the presentation as a final product. A test of presentation procedural knowledge would show that the students had acquired knowledge of OP skills that can be applied to future presentations. Finally, budget constraints limited this study to 16 weeks, and it is known that studies longer than one semester are lacking in CALL research

(Hwang & Fu, 2019) so future research into this field should use a longitudinal study.

9. Conclusion

This study developed WBA teaching material for oral presentations and trained students to develop WBA videos as an alternative approach to OPs in order to develop English academic presentation and multimedia skills. In addition, students took the PRPSA test to investigate if learning and training with WBA helped reduce public speaking anxiety. The results showed that the quality of the presentations significantly improved from the pre-test to the post-test, and public speaking anxiety was significantly reduced in the target group. In addition, interviews and RQM were used to identify the different states that attract or repel learners from adopting WBA as a presentation tool.

It is believed that the WBA allowed these English language students to present more effectively due to the advantages of multimedia for strengthening communication (Beltran-Planques & Querol-Julian, 2018; Kress et al., 2014; Mayer, 2021; Morell, 2017; Yeh, 2018). In addition, an awareness of the affordances of multimodal communication, increased engagement with the learning material and extra practice were all responsible for helping reduce public speaking anxiety.

Despite these affordances, software and training difficulties need to be overcome to make WBA a viable alternative for English academic OPs. WBA software is not developed enough to replace regular OPs at the moment, but it can be incorporated into projects or embedded in regular OPs to help language learners present. It is hoped that the findings from this study can help students develop OP skills by incorporating more multimedia. In addition, researchers can use the findings to help develop new ways of using WBA to teach and improve academic oral presentations.

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Appendices

Appendix 1. WBA presentation holistic rubric

Level 5	The student responds to the task strongly and includes strong information. The language is clear, and the fluency is strong. There is good eye contact and strong evidence of preparation, organization, and enthusiasm for the topic.	*Exceeds Target:* Student has the **knowledge and skills that exceed this learning progression level.**
Level 4	The student responds to the task well and includes an adequate amount of information. The language is mostly clear, and fluency is acceptable. There is adequate eye contact as well as evidence of preparation, organization and enthusiasm for the topic.	*On Target:* Student has the knowledge or skill represented at the learning progression level.
Level 3	The student responds to the task adequately, but does not include much supporting information. The language is unclear at times and has some fluency problems. Eye contact is minimal and it appears that preparation and organization are irregular.	*Below Target:* Student has **slight** misunderstandings/**incomplete** knowledge and skills.

Level 2	The student response is insufficient for the task and fails to provide support enough supporting information. Mistakes in language cause misunderstandings, and fluency is a problem. It appears that there was not much preparation or organization. The student rarely makes eye contact.	*Substantially Below Target:* Student has **substantial** misunderstandings/ **large gaps** in knowledge and skills.
Level 1	The student's delivery is difficult to follow and he/she does not state the task and only provides one piece of supporting evidence. It is difficult or impossible to understand the speaker. It appears the student did not prepare or plan the organization. The student rarely makes or has no eye contact.	*Failed to reach minimal knowledge or skills.* Is very difficult to understand or the student did not prepare for the presentation.

Appendix 2: PRPSA Likert scale questionnaire (Kelsen, 2019; McCroskey, 1970).

Directions: Below are 34 statements that people sometimes make about themselves. Please indicate whether or not you believe each statement applies to you by marking whether you:

Strongly Disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; Strongly Agree = 5.

_____1. While preparing for giving a speech, I feel tense and nervous.

_____2. I feel tense when I see the words "speech" and "public speech" on a course outline when studying.

_____3. My thoughts become confused and jumbled when I am giving a speech.

_____4. Right after giving a speech, I feel that I have had a pleasant experience.

_____5. I get anxious when I think about a speech coming up.

_____6. I have no fear of giving a speech.

_____7. Although I am nervous just before starting a speech, I soon settle down after starting and feel calm and comfortable.

_____8. I look forward to giving a speech.

_____9. When the instructor announces a speaking assignment in class, I can feel myself getting tense.

_____10. My hands tremble when I am giving a speech.

_____11. I feel relaxed while giving a speech.

_____12. I enjoy preparing for a speech.

_____13. I am in constant fear of forgetting what I prepared to say.

_____14. I get anxious if someone asks me something about my topic that I don't know.

_____15. I face the prospect of giving a speech with confidence.

_____16. I feel that I am in complete possession of myself while giving a speech.

_____17. My mind is clear when giving a speech.

_____18. I do not dread giving a speech.

_____19. I perspire just before starting a speech.

_____20. My heart beats very fast just as I start a speech.

_____21. I experience considerable anxiety while sitting in the room just before my speech starts.

_____22. Certain parts of my body feel very tense and rigid while giving a speech.

_____23. Realizing that only a little time remains in a speech makes me very tense and anxious.

_____24. While giving a speech, I know I can control my feelings of tension and stress.

_____25. I breathe faster just before starting a speech.

_____26. I feel comfortable and relaxed in the hour or so just before giving a speech.

_____27. I do poorer on speeches because I am anxious.

_____28. I feel anxious when the teacher announces the date of a speaking assignment.

_____29. When I make a mistake while giving a speech, I find it hard to concentrate on the parts that follow.

_____30. During an important speech I experience a feeling of helplessness building up inside me.

_____31. I have trouble falling asleep the night before a speech.

_____32. My heart beats very fast while I present a speech.

_____33. I feel anxious while waiting to give my speech.

_____34. While giving a speech, I get so nervous I forget facts I really know.