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 OPEN ACCESS

## Australian Journal of Applied Linguistics

ISSN 2209-0959

<https://journals.castledown-publishers.com/ajal/>

*Australian Journal of Applied Linguistics*, 2 (1), 17-31 (2019)  
<https://dx.doi.org/10.29140/ajal.v2n1.118>

# Integrating Multimodal Technologies with VARK Strategies for Learning and Teaching EFL Presentation: An Investigation into Learners' Achievements and Perceptions of the Learning Process



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### Abstract

Successful oral presentation effectually involves multi-faceted training of listening, writing, and nonverbal delivery besides speaking orally, which calls for a systematic holistic/multimodal approach. However, a multimodal learning environment for fostering EFL learners' presentation development remains virtually unexplored. This study employed multimodal strategies adopted from the VARK model (visual, aural, reading/writing, and kinesthetic/gestural) with the support of digital audio, video, and speech visualization technologies in an English presentation course at a university in Taiwan. Two EFL classes served respectively as the experimental group with a technology-mediated multimodal approach and the control group with a traditional oral approach. Specifically, this research evaluated the experimental participants' oral performance and explored their perceptions of this technology-mediated multimodal approach and its advantages and disadvantages as identified by the participants. Results from independent t-tests showed marginal significant progress of presentation performance in the experimental group. Descriptive statistics from the perception survey and content analysis of students' reflective responses indicated that the participants were overwhelmingly positive about technology-supported multimodal activities implemented in the oral training course but encountered psychological and technological challenges when producing multimodal assignments. Theoretically, the results support the extension of multimodal theory to EFL oral presentation education. Practically, the study informs EFL presentation instructors of the validity of technological-enhanced VARK strategies for learning and teaching EFL presentation. The research results also bear significant implications for the necessity of learner training in technology practices when implementing the pedagogy integrating multimodal technologies into EFL speech education.

**Keywords:** English oral presentation; multimodality; VARK

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**Data Availability Statement:** All relevant data are within this paper.

## Background

The rapid development of technologies in recent years has created a great number of possibilities for language learning to shift from traditional, routine lectures toward technology-enhanced learning activities in the classroom. Indeed, with various modes of materials to engage language learners in the learning process, incorporation of technologies such as computers into second language (L2) or foreign language (FL) pedagogy has proved effective for learners to acquire language skills faster and retain language skills longer (Hubbard, 2009). Take speech presentation as an example. Owing to recent advancements in computer technology, what was once ephemeral in a speech event can now be captured by audio and video technology, and auditory patterns of utterances can be visualized, analyzed, and/or annotated by speech analysis programs (Boersma & Weenink, 2015; Scarry-Larkin, 2007) for better pronunciation and prosody. The digital creation and re-presentation of speeches in the form of audio speech recordings, videotaped speech acts, and written speech scripts can be stored in cloud storage systems safely and accessed anytime by oneself, teacher, or peers to review the learning process (Spillner, Muller, & Schill, 2013). Hence, the integration of technology facilitates the training of oral performance and communication competence in speech pedagogy.

The English presentation class has been a core course in many English as a Foreign Language (EFL) departments at technological universities in Taiwan. Although most Taiwanese college students have studied English since primary education, there is still much to be desired in students' English speech competence. A survey of Taiwanese college freshmen conducted by Wang (2003) revealed that most (83.7%) regarded speaking ability as the language skill that most required improvement among the four EFL skills. According to the researcher's teaching experience, which confirmed Wang's study, the common deficiencies in English oral ability found in EFL learners in Taiwan include diffidence, low volume, mispronunciation, unnatural intonation, flat tone, wrong pauses, lack of facial expression, no eye contact, no hand gestures, and ignoring audience feedback. These deficiencies in English presentation need to be addressed urgently. However, traditional instruction of English presentation does not seem to have adequately addressed such ability deficiencies. Hence, it is of top priority to search for an alternative approach by incorporating technologies into presentation teaching and learning so as to enhance students' English speech competence (Nunan, 2003; Rizvi & Lingard, 2010).

Some research has sought to address the insufficiency of students' oral ability via the aid of technology. In Hsu, Wang, and Comac's research (2008), audioblogs were found to be an effective tool to promote students' learning experience of oral presentations. Levis & Pickering (2004) utilized speech visualization technology to teach intonation in speech. Video technology employed in the format of video blogs was utilized to improve EFL students' performance in oral presentation (Hung & Huang, 2015). Video modeling, a form of video technology, has proved to be an effective approach for identifying weaker areas in presentation ability and thus helps reduce students' undesirable behaviors (Lonnecker, Brady, McPherson, & Hawkins, 1994). As noted by Young (2002), successful oral presentation effectually involves multi-faceted training of listening, reading, writing, and nonverbal delivery in addition to speaking orally. Although the above-mentioned studies have empirically examined the implementation of technology into speech education, they only focused on a single modality of speech training. In other words, few studies have employed technology in the training of oral presentation with a systematically holistic/multimodal viewpoint. In contrast, this study attempts to look into the training process of oral ability, and oral presentation skills in particular, from a holistic perspective. Learners' achievement in presentation skills, learning experiences in the process, and perceptions of the project were explored and analyzed to verify the project's effectiveness.

## **Multimodality and the VARK model**

The term “multimodality” often describes the different expressive communication modalities, such as visual, auditory, verbal, gestural, etc., used in many human-machine interfaces (Merchant, 2009) or describes the multiple types of media data, such as audio, video frames, texts, etc., used in multimedia presentations (Li, Zhuang, Yang, & Zhuang, 2009). In the area of education, multimodality can be associated with the established VARK psychometric model developed by Fleming and Mills (1992). Literally standing for visual, aural, reading/writing, and kinesthetic, the VARK model assesses a student’s sensory abilities and preference and then categorizes the student’s preferred learning styles (Fleming & Mills, 1992). For visual learners, they prefer seeing information presented in the format of flow charts or graphics. For aural learners, they prefer listening to others and themselves speaking. As to “R”, it stands for reading/writing preference. For kinesthetic learners, they prefer doing things physically. Mayer (2009) proposed a theory of multimedia learning, which assumed that learners are able to learn more effectively when multiple channels of information input (i.e., a combination of auditory and visual formats) are available. In this vein, the VARK model addresses multi-modes in language learning.

The multimodality theory applied in the area of language learning assumes that the more modes a language skill is taught in, the more the learner will be motivated to understand and remember it (Schewe, 2002). They learn more quickly and at deeper levels; they remember the information they have learned better; what’s more, they enjoy more when learning. Hence, it seems a fair assumption that VARK strategies will help students learn more efficiently.

## **Proposal of an amended VARK model—VARK+**

In this research, a technology-mediated multimodal approach meant that the interplay of visual, aural, reading/writing (print), and kinesthetic/gestural (VARK) modalities was conducted with technologies in an EFL speech training regimen. However, in the original design by Fleming and Mills, the V- aspect of the VARK model strictly refers to charts and graphics rather than videos (VARK Learn Ltd., 2016), whereas video technology has been proven to greatly benefit language teaching and learning (Chuang & Rosenbusch, 2005; Godwin-Jones, 2003). Particularly, video-related technology plays a crucial role in presentation training (Powell, 2011). In view of the need for amendment, the researcher expanded the current VARK model by adding audio, video, and speech visualization technologies into Fleming’s original V- aspect to form a more encompassing VARK model, here dubbed as VARK+ in the current research. All of the technology-mediated multimodal VARK+ exercises aimed to activate students’ senses for better learning outcomes. Students experienced different strategies of learning oral presentation skills in a variety of modes. Sometimes the four modes were used in combination, revealing the interplay of the dimensions of VARK+.

## **Theoretical framework: the VARK model and technologies in a multimodal theory**

This research proposed an approach which provided multiple modes of input adopted from the VARK theory supported by digital technologies to improve EFL presentation skills. The theoretical framework was based on 1) multimodal theory (REF), which assumes that a multiplicity of modes enhances learning outcomes, and 2) the capability of technology to support different modes of learning experiences to strengthen skills acquisition. That is to say, in this research VARK activities were enacted in a technological setting within the framework of the multimodal theory.

## **The Current Research**

As mentioned previously, in the current study the multimodal presentation activities incorporated

with technology were intended to address the inadequacies in learners' presentation skills in an EFL classroom. In addition, the effects of the technology-mediated multimodal activities were explored by investigating students' performance, perceptions and reflections of the learning process.

### Research questions

In view of the preceding rationales, this research was guided by the following research questions:

1. Do the participants' presentation skills significantly improve through the technology-mediated VARK+ approach?
2. What are the participants' perceptions of and attitudes toward the technology-mediated VARK+ approach?
3. What pedagogical implications can be drawn from the technology-mediated VARK+ approach for learning and teaching EFL presentation?

## Methodology

### Context and participants of the study

The study period lasted for one semester, during which the classes met two hours per week for 18 weeks. Two classes of English majors took part in this study. The experimental group had 21 participants, and the control group had 29. All the participants were registered in English presentation courses which introduced English majors to techniques in developing and giving English presentation. All of them were juniors admitted to the same department at the same university of science and technology through a standardized national college entrance exam in Taiwan. In senior high school and college life, they had received training emphasizing English as the target foreign language. A pretest English presentation was required from each participant at the beginning of the study to test for the homogeneity of oral presentation ability.

### Procedure implementation of the technology-mediated VARK+ activities

In this course, the control and experimental groups received the same instructional procedure and the same amount of teaching and practicing in the classroom from the same instructor. The procedure was as follows. The instructor taught the basics of oral presentation such as voice control, body language, content, organization, language use, and delivery skills. These were essential for making effective oral presentation as well as presentation assignments. Students clarified and deepened their understanding of the presentation skills upheld by the course objectives. Between lectures, the participants practiced and performed presentations. After practicing and presenting, the participants received the instructor's feedback.

**Table 1** *Procedure and data collection*

Phase	Period	Control group	Experimental group
<i>Pre-training</i>	<i>1<sup>st</sup> week</i>	Pretest presentation	Pretest presentation
<i>Training</i>	<i>2<sup>nd</sup>-16<sup>th</sup> weeks</i>	Course instruction / in-class presentation practices/feedback in the traditional oral approach	Course instruction / in-class presentation practices/feedback in the form of technology-mediated VARK+ activities
<i>Post-training</i>	<i>17<sup>th</sup>-18<sup>th</sup> week</i>	Posttest presentation	Posttest presentation / survey / reflections

### ***Format of activities***

The two groups underwent the same procedure described above but with different approaches. The control group received course lectures, in-class presentation activities as well as feedback in a traditional oral approach. For the experimental group, a technology-mediated multimodal learning environment was provided in the classroom to facilitate the lectures and the practices of VARK+ activities, to display teaching materials, and to give feedback (see Table 1). For example, by the technology-mediated multimodal approach, the researcher employed VARK+ stimuli during the process with the support of technology such as audio playback, speech visualization, and video technology. Specifically, Cool Edit, a speech visualization program, was incorporated to provide graphic feedback such as speech volume, speaking rate and pitch contour for learners' review; learners' presentations were videotaped to allow immediate visual re-presentation of various components of the learner's body language during a speech delivery. In other words, the experimental group received feedback by watching their performance videos posted in the cloud drive, listening to audio files of their presentations, or reviewing speech visualization, while the control group received the instructor's individual comments orally regarding their performance.

### ***Types of activities***

The duration of the VARK+ activities, depending on the format and levels of complexity, ranges from 5 minutes to 100 minutes. They included a series of VARK+ pedagogies: voice projection and flow (A), prosodic enhancement, expansion of pitch range, shadowing and mirroring (in terms of voice and body language) (K), storytelling, reading theatre (R), and graphic feedback (V), etc., all of which fostered speech skills. Equivalent practice activities without the intervention of technologies and multimodal elements were carried out in the control group's classroom by the instructor's lectures.

### **Measures**

#### ***Instrumentation***

Both quantitative and qualitative data sources were included in the study. Quantitatively, participants' English presentation achievement was tested via a pretest presentation at the beginning of the semester and a posttest presentation at the end of the semester. They were evaluated on 14 skills proposed by Yamashiro and Johnson (1997) (Table 2). It was used to evaluate their achievement in oral presentation skills. In addition, a perception survey was adapted from Hsu, Wang, and Comac's (2008) and Yang's (2003) studies respectively, with revisions of the statements to fit this project's context. This perception survey contained 16 items on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). It was used to explore the experimental participants' beliefs in, perceptions of, and attitudes toward learning process in receiving the VARK+ activities. The Cronbach's alpha of the adapted survey was .80.

Qualitatively, an open-ended reflection questionnaire was partly adapted from Hsu, Wang, and Comac's (2008) and Yang's (2003) studies respectively. It contained 6 items probing the experimental participants' in-depth opinions of the advantages and disadvantages of using VARK+ activities as an approach to oral presentation training. To triangulate the data collected through the instruments, teacher's teaching logs were kept in order to verify the accuracy of students' perceptions reflected in the above instruments. In addition, students' learning outcomes such as written speech scripts and video and audio files stored in the cloud storage system were collected as evidence during the learning process.

### *Rating of the oral performance*

A pretest presentation and a posttest presentation served as measures of students' achievement in oral presentation skills. The grading criteria were the 14 speech skills from the Yamashiro and Johnson (1997), which was further validated by Yamashiro (2002). Each presentation, recorded by video, was judged on the 14 criteria. The scoring scheme was shown in Table 2, making 100 as the full score of a presentation, a grading convention in Taiwan. To avoid possible rating bias, each presentation was rated by two raters, the researcher and an experienced EFL teacher in speech education, and then averaged to represent the oral performance of that particular speech act. The inter-rater reliability was .92, measured by percent of score agreement.

**Table 2** *Scoring scheme for presentation performance*

	<b>Item</b>	<b>Itemized score</b>	<b>Total score</b>
1	Posture	10	
2	Eye contact	10	
3	Gesture	10	
4	Voice projection	10	
5	Speed	10	
6	Intonation	10	
7	Diction	10	
8	Speech purpose		100
9	Speech topic	10	
10	Beginning		
11	Speech body	10	
12	Ending		
13	Language		
14	Vocabulary	10	

### **Data collection and analysis**

For data analysis, the researcher examined the quantitative information amassed by oral presentation performance marks, which was analyzed by independent *t*-test. Performance data were collected twice during the research period over an academic semester: the pre-training phase at the beginning of the academic semester and the post-training phase at the end of the semester. Five-scaled perception surveys were collected at the end of the research project and analyzed by descriptive statistics.

In addition, qualitative information was gathered from the experimental group through open-ended questionnaires at the end of the semester to verify the results of quantitative data. As to the analysis of qualitative information, the researcher invited a speech expert for discussion to establish rating alignment prior to the task of data sorting; after the first round of data previewing, the discussion was held again. Throughout the process of categorizing the data into themes and key points, the two teachers constantly double-checked with each other, making sure both mutually agreed with the sorting decision, and reached consensus on theme categorization as well as key-point extraction through discussion. Regular discussion between the raters established an inter-rater reliability of .85, calculated by percentage agreement of theme and key-point categorization.

## Results

### Quantitative results

#### *Students' oral presentation performance*

All participants' first presentation as a pretest and the final presentation as the posttest were recorded, rated, and analyzed statistically (Table 3). In the pretest, the two groups of students did not perform differently ( $t(48) = .5254, p = .6017$ ). It proved that the two groups of participating students had homogeneity in presentation achievement at the beginning of the research.

In the posttest, the presentation performance of the experimental group exhibited marginally significant difference ( $t(48) = 1.9253, p = .0601$ ) from that of the control group, which was very close to the significance level ( $p = .05$ ). Statistical dichotomization into significant and non-significant results can potentially dismiss observed differences as well as the deemed "no-difference" but usually more interesting null hypothesis (Gelman & Stern, 2006), so one needs to examine the effect size (Cohen's  $d$ ), which was 0.5486 in this case. According to Cohen (1977), a medium effect of .5 is visible to the naked eye of a careful observer. A person from the experimental group with an average score (i.e., mean) would have a higher score than 69% of the people from the control group. That is, with a Cohen's  $d$  at the level of .5, 69% of the experimental group will be above the average score of the control group (Cohen's U3 distribution overlap); furthermore, there is a 64 % probability that someone picked at random from the experimental group will have a higher score than someone picked at random from the control group, which is called probability of superiority.

The medium effect size bore practical implications regarding the relationship between VARK+ instruction and oral presentation achievement. It represented that the experimental group under the instructions of VARK+ activities had a moderately improved performance in comparison to the control group under the traditional approach.

**Table 3** *Experimental group's and control group's performances (df=48)*

	Variable	N	Mean	SD	t	Sig. (2-tailed)
Experimental	Pretest	21	77.0476	8.9189	.5254	.6017
Control		29	75.8966	6.5865		
Experimental	Posttest	21	83.5	8.5980	1.9253	.0601
Control		29	78.9310	8.0487		

#### **Students' perceptions toward VARK+ curriculum**

All the 21 students of the experimental group filled out the VARK+ perception survey at the end of the research. The result was shown in Table 4.

All of the participants (100%) unanimously agreed that the technology-mediated VARK+ activities were a good approach to help students learn (see Q3). All of them also agreed that it had been successful to use technology-mediated VARK+ activities for teaching and evaluation in this course (see Q9), and 20 (96%) students agreed that their personal experience of learning through technology-mediated VARK+ activities in this course had been successful (see Q8).

**Table 4** Results from the VARK+ perception survey (N=21)

Items	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)	Average	SD
1. The technology-mediated VARK+ activities are a good approach to scaffold my learning/speaking process.	8 (38%)	12 (57%)	1 (5%)	0	0	4.3	0.577
2. The technology-mediated VARK+ activities increase the interaction between students and the instructor.	8 (38%)	9 (43%)	4 (19%)	0	0	4.2	0.750
3. The technology-mediated VARK+ activities are a good approach to help students learn.	11 (52%)	10 (48%)	0	0	0	4.5	0.512
4. The technology-mediated VARK+ activities provide a multidimensional perspective about learning.	9 (43%)	10 (48%)	2 (10%)	0	0	4.3	0.658
5. The technology-mediated VARK+ activities will help my learning in future courses.	7 (33%)	11 (52%)	3 (14%)	0	0	4.15	0.680
6. The technology-mediated VARK+ activities are a good approach to evaluate my/cohorts' performance.	11 (52%)	6 (29%)	4 (19%)	0	0	4.35	0.796
7. The technology-mediated VARK+ activities provide a multidimensional perspective about evaluation.	10 (48%)	9 (43%)	2 (10%)	0	0	4.35	0.669
8. My experience of learning through technology-mediated VARK+ activities in this course has been successful.	6 (29%)	14 (67%)	0	1 (5%)	0	4.15	0.680

9.	It has been successful to use technology-mediated VARK+ activities for teaching and evaluation in this course.	11 (52%)	10 (48%)	0	0	0	4.5	0.512
10.	I will use the technology-mediated VARK+ approach in my future learning.	9 (43%)	5 (24%)	7 (33%)	0	0	4.05	0.889
11.	Compared to traditional paper works, the Google Drive is a good tool to archive my works.	15 (71%)	5 (24%)	1 (5%)	0	0	4.65	0.577
12.	I prefer using audios or videos to record my presentation rather than presenting in the classroom.	4 (19%)	7 (33%)	5 (24%)	4 (19%)	1 (5%)	3.5	1.165
13.	I think we should use multi-dimensional evaluation methods.	7 (33%)	10 (48%)	4 (19%)	0	0	4.15	0.727
14.	I have stronger confidence in English presentation now.	2 (10%)	12 (57%)	6 (29%)	1 (5%)	0	3.7	0.717
15.	I have easy access to the Internet. Doing my homework is not difficult for me.	11 (52%)	9 (43%)	1 (5%)	0	0	4.45	0.602
16.	I face a lot of problems in the process of creating and uploading audio/video entries.	2 (10%)	5 (24%)	5 (24%)	5 (24%)	4 (15%)	2.9	1.289

In general, figures from Q3, Q8, and Q9 indicated that students highly approved of the implementation of VARK+ programs in the oral presentation class and its positive effects on helping them to learn oral presentation. In addition, 20 students (96%) approved of using a cloud drive to keep track of their learning output in VARK+ activities (Q11). Also, 20 students (96%) showed their confidence in accessing the Internet (Q15). In general, figures from Q11 and Q15 revealed that students have an affinity and adroitness for technology.

However, it should be noted that only 11 students out of 21 (52%) preferred using audio or video to record their presentations rather than presenting in the classroom (see Q12). This means that contrary to the accepting attitude toward technology implementations in VARK+ activities shown by the results of Q3, Q8, and Q9 above, they did not like to use recording technology when they were required to do

audio or video assignments for presentation. Moreover, despite their affinity and adroitness for surfing the Internet (Q15), only 9 students (39%) did not think they faced a lot of problems in the process of creating and uploading audio/video files (Q16).

### **Qualitative results of student perceptions**

The collected reflection supported the quantitative survey results. All of the participating students agreed that VARK+ activities and videos enhanced learning. All agreed that, from visual and audio visualization feedback, they realized more about what and how to improve their presentation performance. All agreed that the accumulated assignment portfolio could be used as part of course evaluation because the effort of making multimodal presentations itself deserved recognition.

Despite positive feedback on VARK+ activities, they also voiced certain concerns. Three major concerns emerged from the participants' reflections: psychological barriers, technological barriers, and the nature of multimodality.

#### **Psychological barriers**

The participating students dreaded watching their own images and listening to their voices recorded in the multimodal presentation even though they recognized the usefulness of video in self-improvement. "Embarrassment" is a recurring keyword in quite a few participants' reflections. One student noted that:

If there weren't this means [video review], I probably would never be able to improve (even though viewing my own performance on the video really embarrassed me) .... Some of our classmates are so shy that they dare not look at their own videos. (Participant 15E)

I know I can review my inadequacies [recorded on video] and seek to improve myself, but sometimes I feel almost too embarrassed to open the video file. (Participant 13E)

One participant simply said:

I feel so ashamed when I watched myself giving presentation [on video files]. (LOL.) (Participant 9E)

#### **Technological barriers**

##### *Hardware and software challenges*

The participants mentioned that they felt daunted by the use of technology involved in support of the VARK+ activities and assignments. ClassNotebook, a free platform developed by Microsoft to support classroom activities, was chosen to be the place for VARK+ assignment announcements and submissions. It also allowed students to keep learning notes. Several students mentioned the prerequisites were high. Others said they had problems at the beginning.

One has to be fully equipped (with WiFi, internet access, laptop, etc.) and one has to be well familiar with the technologies of the audio- / video- sorts. (Participant 6E)

It might take some time to get used to certain functions (I personally did not know how this work the first time I used it and had to text for help.) (Participant 16E)

Seven participants complained about the unfriendly design to execute various functions of

ClassNotebook. Five mentioned that the ClassNotebook platform was not reliable, causing assignment submission problems.

Oftentimes the typed input to the system simply disappeared. This is totally devastating!  
(Participant 11E)

Some classmates will get confused about using OneDrive. (Participant 16E)

### ***Mobile dependence***

To them, the use of technology in the course of learning was not convenient because they expected their personal mobile devices to support most of the course instruction or let them upload assignments smoothly.

Even though an app has been installed on my mobile phone, it is still hard to navigate the platform on it. (Participant 18E)

The platform ClassNotebook has a serious lag in sync. The PC version of the platform is barely OK in this regard, but its mobile app version is a terrible flop: if it is not updated constantly, it will only retain the old data [previously submitted assignments]. (Participant 15E)

### **Overwhelming multimodality**

The benefits of VARK+ activities seemed to be the victim of its success. One student aptly pointed out that there were too many activities going on in the course, making her somewhat overwhelmed and confused.

Indeed with VARK activities we can see our merits and weaknesses via many different activities, and we can find the ways of learning that best suit us. Despite many advantages of VARK activities, so many varied activities within a short period of time may lead to a loss of [learning] focus. (Participant 11E)

## **Discussion and Conclusion**

In the current study, the multimodal presentation activities incorporated with technology were intended to address the inadequacies in learners' presentation skills in an EFL classroom. In addition, the effects of the technology-mediated multimodal activities on students were explored by investigating students' perceptions of learning. Several findings arose from the quantitative and qualitative data. First, the improvement in the experimental group's presentation skills was marginally significantly different, and the medium effect size indicates the learning outcome of the experimental group has medium degree of improvement at the end of the research. Second, the mixed results from the perception survey results showed that students were highly positive about VARK+ activities as part of teaching and learning oral presentation skills in the classroom, but they did not like producing multimodal assignments.

The marginal significance with moderate effect size is an encouraging sign of positive influence of VARK+ activities, which reveals the value of learning oral presentation in multimodal ways. Students' reflections confirmed the effectiveness and participants' acceptance of the course. Yet, students' reflections also revealed that too much of a good thing is likely to dampen its effectiveness somehow:

there were so many multimodal activities conducted within a short period of time that they might lose focus. Perhaps this leads to diminishing the achievement of presentation performance and hence the progress of presentation performance appears to have a marginal statistical significance ( $p = .06$ ) at the end of the research.

Regarding the participants' ambivalence about the multimodal approach in the classroom and producing multimodal assignments shown by the results of Q12 and 16, there are several possible reasons which might explain such inconsistency. Students' voices emerging from the open-ended reflection questionnaire supported the above findings and yielded further clues to the learners' unwillingness of producing multimodal assignments despite their positive attitude toward the multimodal teaching approach. First, contrary to a general assumption about the "digital native" generation, who are supposed to feel comfortable being surrounded by and being part of digital production (McBride, 2009), reflections from the participating students revealed that they dreaded watching their own images and listening to their voices. Video self-display is uncomfortable and unnerving, contrary to the beneficial observations of technology to motivation and self-confidence (Lee, 2006; Ushida, 2006; Wang & Wang, 2010). Even though they understood the rationality of doing so and that self-analyzing their own presentation performance on audio or video files would benefit them a great deal, affectively they had an aversion to being recorded in audio or video formats when doing assignments. Perhaps this is one possible reason to explain why almost 50% of them preferred presenting in the classroom rather than using audio or video to record their presentation performance.

Therefore, the instructor should seek ways of relieving language learners from video fear which gets in the way of a good presentation performance. Cross disciplinary knowledge informed by psychological research which explains the reasons behind video fear should be brought into class teaching. Making language learners aware that negative self-image is a concoction of confirmation bias (Story, 1998) and mere-exposure effect (Mita, Dermer, & Knight, 1977) will help learners to falsify their negative self-image so that seeing themselves on camera will no longer induce anxiety and resistance in them.

Another possible root cause for the less favorable responses for Q12 and Q16 may be technological barriers mentioned in student reflections. Technological barriers can be discussed in two perspectives. The first one is the inconvenience of producing and uploading assignments via non-mobile devices. Participating learners, like most of the digital natives nowadays, greatly rely on mobile devices to accomplish almost every day-to-day task (Rashid, Cunningham, Watson, & Howard, 2018), including completing and submitting assignments. Due to the size of multimodal instructions and multimodal assignments, sometimes they had to employ non-mobile devices to ensure smooth production and uploading of their assignments and better viewing effects. They felt great inconvenience if their mobile devices could not support the instructions well or could not let them upload assignments without any hiccups.

To increase the willingness of making multimodal assignments, instructors should consider adopting mobile-friendly software or system interface so as to create smooth user experiences and thus decrease resistance from students against producing multimodal assignments.

The second source of technological barriers probably comes from hardware or software problems which language learners are unable to solve, as mentioned in the student reflections. If there were so many inconveniences and difficulties to be overcome when it came to making productions for multimodal assignments, they might as well opt for a traditional presentation format held in the classroom. The finding seems to indicate that although language learners are regular computer users (as shown by Q15) they are not necessarily adroit in using technology for learning (Hampel, 2006).

This is concordant with previous research which showed that learners were not ready to transfer their individual uses of technology to language learning tasks (Hubbard, 2013; Stockwell & Hubbard, 2018). Most learners need guidance and training to use educational technological devices effectively for language learning. Hence, language learners should be scaffolded with learner training regarding the use of multimodal technology. Doing so will bestow them with improved technological abilities so as to implement a technology-mediated multimodal approach in language learning with full effect.

The importance of learner training has gradually gained research attention. Learner training regularly, even for only a short period of time (say 15 minutes every week) in class, creates a great difference in learning outcome (Stockwell & Hubbard, 2018). Hence, if TELL is to be successfully implemented in language education, learner training should be further adopted as part of a cross-disciplinary curriculum to aid language learners when they have a need for creating assignments in new formats. Nevertheless, it entails an issue of how class time should be allotted and for what purposes. Obviously, the time spent for learner training will delay the progress of the syllabus and even cast reversed impact on the accomplishment of class objectives. How the integration and balance of effective learner training for multimodal technologies should be made remains something for language educators to research further.

In short, the results of the current study bear several significant theoretical and practical implications for future development of pedagogy in the integration of multimodal technologies in EFL oral presentation education. Theoretically, the results support the extension of multimodal theory to EFL oral presentation education. Practically the study informs EFL presentation instructors of the validity of technological-enhanced VARK+ strategies for learning and teaching EFL presentation. In addition, the results also suggest the importance of incorporating extra help to students with regard to psychological boosting and technological affordances such as mobile device integration and learner training for knowledge and skills in technologies, hardware, and software that are needed for producing multimodal assignments. Doing so may alleviate learners' resistance to multimodal assignments when implementing multimodal approaches in teaching.

The present study is an initial exploration to integrate technologies and VARK+ strategies in teaching speaking proficiency with a result of marginal significance found between experimental and control groups. It inevitably has some limitations. One of the limitations is the relatively small number of participating students. A larger number of participants might elucidate the current outcome in a more defined manner. Another limitation lies in the homogeneity of discipline to which the participating students belong. The present study consists of English majors. Further research may recruit non-English majors to examine whether the use of technology via VART+ activities will yield effective results regarding the improvement of non-English majors' English-speaking proficiency. Future research may also explore how this approach impacts students from different disciplines regarding levels of unwillingness to produce multimodal assignments, thus clarifying the relationships between student background and this phenomenon of multimodal production avoidance.

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#### Acknowledgements

This research was funded by the Ministry of Science and Technology in Taiwan under the contract MOST 106-2511-S-025-001. The author is most grateful to Dr. Howard Lees for constructive comments and proofreading.