

Effectiveness of Automatic Speech Evaluation System in Improving Students' Self-efficacy in Oral English Learning

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Abstract: Most college teachers find that Chinese students are not flexible enough in using English and they have poor vocabulary in oral expression and inaccurate pronunciation. This research aims to explore the effect of using Automatic Speech Evaluation (ASE) system on the first-year college students' oral performance in fluency, accuracy, and integrity: whether teaching oral English through ASE is better than regular instruction and whether this technology can improve the students' self-efficacy in learning oral English. The findings of the study show that there is a significant difference on the participants' level of oral competence and self-efficacy in Oral English Learning before and after the use of the ASE system.

Keywords: Automatic Speech Evaluation technology; Self-efficacy; Oral English

1. Instruction

1.1 Problems in Oral English Learning

Language is a tool for communication. The main purpose of learning a language is to communicate, and the communication focuses on listening and speaking. Influenced by the traditional exam-oriented education system, for many years, most colleges and universities in China have focused on the cultivation of students' reading and writing ability in college English teaching, with little listening training and even less oral practice. In teaching, we often find that students have poor vocabulary in oral expression, with more Chinglish expressions and inaccurate pronunciation. Some students even fail to master word spelling, linking and light consonant turbidity. These phenomena may lead us to think that students do not attach importance to oral English. However, this is not the case. According to the communication between the author and the students, when asked which aspect of the students' English ability they most hope to improve, more than 90% of the students said that they most hope to improve their oral expression ability, not willing to learn dumb English. At the same time, students said they were afraid of speaking practice. The reason lies in their anxiety when speaking in English. There are significant positive relations between the self-efficacy and academic achievement as well as between the self-efficacy and self-regulated learning abilities. So improving students' self-efficacy in learning spoken English is the focus of this investigation.

1.2 The Automatic Speech Evaluation System

This proposed study will take the well-known Chinese Automatic Speech Evaluation System, FiF, as an example. Developed by the iFLYTEK (iFLYTEK CO., LTD.), the FiF Smart Learning Platform, is an integration of learning, teaching, assessing and testing. It is a well-known listed intelligent voice and artificial intelligence company in the Asia-pacific region, comprising many functional sub-modules, including the FiF oral language training system, testing system, and evaluation system. Among them, the FiF oral language evaluation system is based on internal phonetic and syntactic models that convert the incoming speech signals into a series of words and instantly evaluate students' oral performance with a composite score, whose main features are immediacy, flexibility, error recognition, and privacy protection.

In this background, this thesis will focus on its speech evaluation system with its dimensions of

accuracy, fluency, and integrity to examine its effectiveness in enhancing students' self-efficacy in oral English learning.

1.3 Theory of Self-efficacy

The concept of self-efficacy was proposed by Albert Bandura, a cognitive psychologist in 1977^[1]. He defined self-efficacy as a personal assessment of how well one can perform the actions required to deal with future situations. Self-efficacy is defined as a person's subjective convictions to complete or learn a specific task successfully, given the skills he/she possesses^[2]. People need to know about themselves and their capabilities in order to control their actions. These self-efficacy beliefs provide the foundation for human motivation, well-being, and personal accomplishment. People who hold low self-efficacy beliefs do not like to face challenges and usually avoid difficult tasks. In contrast, those with high self-efficacy beliefs willingly take on challenging tasks and demonstrate lower levels of anxiety^[3].

According to Albert Bandura, self-efficacy expectation determine whether an individual will be able to engage in coping behavior and how long effort will be sustained when faced with obstacles. Individuals with a high level of self-efficacy will put in sufficient effort that, if done well, will lead to successful outcomes, whereas those with a low level of self-efficacy are likely to quit early and fail^[4].

1.4 Previous Study on Self-efficacy

Mingxu Liu believes that self-efficacy can be enhanced by behavioral outcomes and environmental inputs^[5]. Bandura points out that self-efficacy refers to the belief in one's capabilities to learn or perform behaviors at designated levels. It is closely related to one's own personal abilities to perform a specific task or a range of tasks in a given domain. How learners believe they can perform may predict better than their actual ability. Self-efficacy is an important component of self-regulatory learning process and a significant predictor of academic success across subject areas, culture, and gender^[6].

Bearing this background in mind, the researchers of this study would like to take self-efficacy as a component of affective factors to explore its influence on college oral English learning, and hope to find out how to improve the oral English learning from the aspect of self-efficacy with the help of the automatic speech evaluation system.

1.5 Research Questions

The purpose of this study is to evaluate the effectiveness of ASE on the first grade students' oral English performance in fluency, accuracy, and integrity. The study focuses on investigating the effectiveness of using ASE on developing students' performance in improving students' self-efficacy in learning oral English. This study aims to answer the following questions:

- (1) What is the level of oral competence of the participants before and after the use of ASE System in terms of fluency, accuracy and integrity?
- (2) What is the level of self-efficacy of the students in Oral English Learning before and after the use of the ASE System?
- (3) Is there a significant difference on the participants' level of oral competence and self-efficacy in Oral English Learning before and after the use of the ASE System?
- (4) What are the challenges encountered by the participants in using ASE System?
- (5) What components of self-efficacy in Oral English Learning be included or enhanced in the ASE System?
- (6) What enhancements can be suggested to improve students' self-efficacy in oral English learning using the ASE System?

2. Methodology

2.1 Research Design

Given the above research questions, a quantitative study will be conducted with a sample group utilizing ASE system to learn oral English. The sample group will be given a pretest and a post-test

about oral English competence before and after the use of this system. Meanwhile a survey questionnaire related to self-efficacy in learning oral English will be conducted before and after the use of ASE system. The collected data will be analyzed with SPSS to answer the questions.

2.2 Participants of the Study

The study sample consisted of 40 (20 males and 20 females) First-year college students majoring in computer science in the second semester of the academic year 2022-2023 of Guangzhou College of Commerce, Guangdong, China. They have never used ASE system before the pretest and the first survey.

2.3 Instrumentation

In this study, two different instruments were employed: (a) a College English Test — Spoken English Test Band 4 through FIF ASE system to investigate the participants' oral English proficiency level; and (b) an oral English self-efficacy questionnaire adapted from Schwazer & Jerusalem^[7] and Hairuzila Idrus et al.^[8]. The main sections of the College English Test—Spoken English Test Band 4 used in this study are “Read Aloud” “Question & Answer”, and “Individual presentation”, including two steps for each section, namely practice and challenge. The questionnaire was translated, and the translated version was then checked for accuracy by eliciting the judgment of several experts.

2.4 Data-gathering Procedure

To monitor the level of oral competence of the participants before and after the use of ASE System in terms of fluency, accuracy, and integrity, the researchers will invite the participants to take part in a pretest of a CET- SET4 before they start practicing their oral English with this system and then give them a post-test of the same test after the training program which will last for 8 weeks. Finally, the researchers will collect the statistics data on students' oral competence, including the above three aspects from the ASE system. With the sample statistics, the researchers will check if there is any improvement of participants' oral competence after using this system.

To survey the level of self-efficacy of the students in Oral English Learning before and after the use of the ASE System, a questionnaire of oral English learning self-efficacy adapted from Schwazer & Jerusalem and Hairuzila Idrus et al. will be employed. The authors will invite the participants to complete the same questionnaire before and after using the ASE System. The questionnaire consists of 26 items which was classified as three dimensions: Self-efficacy for the confidence in oral English learning outcome (item 1-15); Self-efficacy for the initiative of making efforts (item 16-20); Self-efficacy for the capability of solving problems (21-25); item 26 is designed to collect information about question 4. The items are scored using a Likert-type scale ranging from 1 (I am unable to do this) to 5 (I am able to do this well) in terms of three dimensions: (a) self-efficacy for the confidence in oral English learning results, (b) self-efficacy for the initiative of making efforts, (c) Self-efficacy for the ability in solving problems. The Chinese version was also provided to the students, and it took about 10–15 minutes for the students to complete the survey. The participants are required to judge their self-efficacy in learning oral English by answering this questionnaire.

2.5 Statistical Analysis

The Statistical Package for Social Sciences (SPSS 26.0) software is used to conduct the required statistical analysis of the data related to the objectives of the study. The means, standard deviations, and significant difference are conducted for all the study variables, including participant's oral English competence (in terms of fluency, accuracy, and integrity) on the pretest and post-test, and self-efficacy in oral English learning before and after using ASE system.

3. Findings and Discussion

3.1 Findings Related to Participants' Oral Competence

The data were processed with SPSS 26.0. Paired samples T-test was done to calculate the differences in the mean scores of the Participants' oral competence before and after the use of ASE System. The first test was to find the general differences between the two test from three aspects

(fluency, accuracy, and integrity).

Table 1: Mean result of the Participants' oral competence before and after the use of ASE System

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest score	78.83	40	11.417	1.805
	Post-test score	88.43	40	3.941	.623
Pair 2	Accuracy Pretest	71.08	40	11.720	1.853
	Accuracy Post-test	82.48	40	4.489	.710
Pair 3	Fluency Pretest	86.55	40	12.208	1.930
	Fluency Post-test	94.28	40	3.449	.545
Pair 4	Integrity Pretest	94.88	40	11.266	1.781
	Integrity Post-test	99.48	40	.716	.113

Table 2: T-test analysis on the Participants' oral competence before and after the use of ASE System

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest score - Post-test score	-9.600	11.059	1.749	-13.137	-6.063	-5.490	39	.000*
Pair 2	Accuracy Pretest-Accuracy Post-test	-11.400	10.952	1.732	-14.903	-7.897	-6.583	39	.000*
Pair 3	Fluency Pretest-Fluency Post-test	-7.725	12.096	1.913	-11.593	-3.857	-4.039	39	.000*
Pair 4	Integrity Pretest - Integrity Post-test	-4.600	11.331	1.792	-8.224	-.976	-2.567	39	.014*

*significant at 0.05 level (2-tailed).

According to the mean results in Table 1, the final score on pretest is 78.83 and that of post-test is 88.43, which has got an increase of 9.6. The average accuracy of their speech rises from 71.08 in the pretest rises to 82.48 in the post-test, which demonstrates the biggest increase among the three components. Meanwhile, the mean score of the fluency shows a remarkable growth of 7.725. In addition, the participant's best performance lies in integrity with 94.88 in pre-test and 99.48 in post-test. It is obvious that all the four mean scores of the participants on the post-test are much higher than those on the pretest. The difference in this finding may be attributed to the method of using of ASE system. After training through computer-assisted learning based on ASE, the results showed significant improvement in accuracy and fluency of students' oral English.

According to the T-test results in Table 2, the probability values of all the four pairs are all lower than 0.05, rejecting the null hypothesis. This reveals that there are statistically significant differences on the participants' level of oral competence before and after the use of the ASE system. Thus, the participants' oral performance in oral English test has been improved after eight weeks of training through ASE system.

According to the findings of this study, ASE system is found to offer a great opportunity in teaching oral English. It can break the limitation of the classroom teaching where students may get much less individual feedback about their performance in spoken English.

3.2 Findings Related to Participants' Self-efficacy in Oral English Learning

A survey was conducted with a 26-item questionnaire. The questionnaire was completed by the participants before and after the use of ASE system. Cronbach's alpha was used to measure the reliability coefficient of the entire scale. The three dimensions were all found to be reliable. And then the data collected from the survey questionnaire were analyzed with SPSS.

According to the figures in Table 3, the survey found that 40 students chose 1000 times in 25 sub-items before and after using the ASE system respectively. Before using the ASE system, 329 times of self-efficacy scores of 4 and 5 (that is, higher degree of self-efficacy) were selected, accounting for 32.9%. After using the ASE system, 398 times (with the percentage of 39.8%) were selected with self-efficacy scores of 4 and 5 (that is, the higher degree of efficacy). This shows that ASE system enhances students' sense of self-efficacy.

Table 3: The level of Self-efficacy before and after using the ASE system

	≥4(higher self-efficacy)	3 (middle self-efficacy)	≤2(lower self-efficacy)
Before	32.9%	44.7%	22.4%
After	39.8%	42.1%	18.1%

Another paired samples T-test was done to calculate the differences in the mean scores of the Participants' self-efficacy in Oral English learning.

Table 4: Mean result of Participants' self-efficacy in Oral English learning before and after the use of the ASE System

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dimension 1 (before)	3.1183	40	.70010	.11070
	Dimension 1 (after)	4.2417	40	.42719	.06754
Pair 2	Dimension 2 (before)	3.0300	40	.77068	.12186
	Dimension 2(after)	4.2150	40	.49487	.07825
Pair 3	Dimension 3 (before)	3.0900	40	.73023	.11546
	Dimension 3 (after)	4.2800	40	.50799	.08032
Pair 4	Total (before)	3.0794	40	.68641	.10853
	Total (after)	4.2456	40	.44367	.07015

Table 5: T-test analysis on Participants' self-efficacy in Oral English learning before and after the use of the ASE System

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Dimension 1 (before) - Dimension 1 (after)	-1.12333	.34012	.05378	-1.23211	-1.01456	-20.889	39	.000*
Pair 2	Dimension 2 (before) - Dimension 2 (after)	-1.18500	.40354	.06381	-1.31406	-1.05594	-18.572	39	.000*
Pair 3	Dimension 3 (before) - Dimension 3 (after)	-1.19000	.46839	.07406	-1.33980	-1.04020	-16.068	39	.000*
Pair 4	Total 1 (before) - Total 2 (after)	-1.16611	.34854	.05511	-1.27758	-1.05464	-21.160	39	.000*

*significant at 0.05 level (2-tailed).

As shown in Table 4, the mean result of 15 items in the first dimension is 3.1183 before the the use of ASE system and it goes up to 4.2417 after the use of ASE. And the result of the second and third dimensions are respectively 3.0300 and 3.0900 before using the system and after the use of the system, and the average results come up to 4.2150 and 4.2800 separately. Thus the mean result of total score shows a rise of 1.16611 after the use of the ASE System.

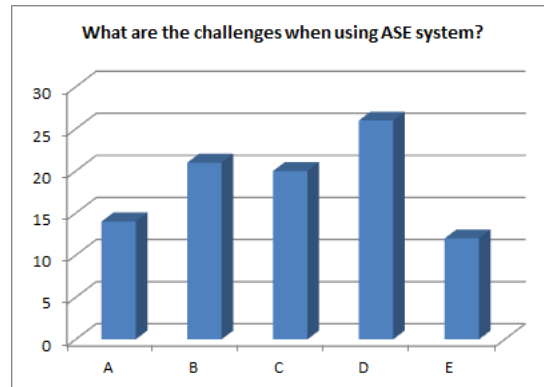
The probability value of the all the four pairs of data in Table 5 is 0.000, which is lower than 0.05 and means there are statistically significant differences on the self-efficacy in oral English learning before and after the use of the ASE System. Based on the findings in Table 5, the participants have improved their self-efficacy in oral English learning after using the ASE system. Therefore, the ASE may be regarded as an effective tool in facilitating oral English learning process which promotes the increasing of students' performance in fluency, accuracy and integrity.

ASE can give reliable feedback on oral English improvement over time. ASE is helpful for students in improving oral English, especially for the non-native speakers, and there is statistically significant improvement in the fluency and accuracy. This finding may be attributed to the fact that the participants might use speech evaluation to practice oral English more independently, and this can reduce foreign language classroom anxiety, which might help students who are afraid of practicing speaking in public to improve their oral competence.

3.3 Findings Related to the Challenges Encountered in Using ASE System

Below are the five challenges encountered by the participants in using the ASE system. (see Figure 1), of the 40 participants, 14 students (with the percentage of 35%) were unable to operate the ASE system smoothly. 21 students (with the percentage of 52.5%) were unable to take good use of the free

materials provided in ASE system. 20 students (with the percentage of 50%) were unable to access online customer service immediately when encountering some technique problems. 26 students (with the percentage of 65%) were unable to figure out the mistakes/problems of their pronunciation when they were given a lower grade by the ASE system. Only 12 students (with the percentage of 30%) cannot practice oral English with the ASE system regularly according to planned timetable. We also find that students with high self-efficacy will make full use of the learning resources provided by the ASE system when they practice oral English online (with the percentage of 73.7%).



A refers to “I am not able to operate ASE system smoothly.” *B* refers to “I am not able to take good use of the free materials provided in the system.” *C* refers to “I am not able to access online customer service immediately when encountering some technique problems.” *D* refers to “I am not able to figure out the mistakes/problems of my pronunciation when I was given a lower grade by the system.” *E* refers to “I am not able to practice oral English with this system regularly according to planned timetable.”

Figure 1: Challenges encountered in using ASE system

Based on the results of the questionnaire, it is suggested that the self-efficacy for the initiative of making efforts should be included in the ASE system. The system does not keep a complete record of students' scores for each exercise or challenge, but only the current score, so students do not have a clear picture of the trend of their oral performance in that task. Thus the students' initiative to make efforts is greatly reduced. If the system can visualize students' past oral performance in each task as a graph, on the one hand, students can understand their strengths and weaknesses, stimulate their intrinsic motivation and thus enhance the sense of effort; on the other hand, teachers can reasonably adjust their teaching plans based on the graphs of students' oral performance.

In addition to improving the ASE System, language teachers should give full play to scaffolding to enhance students' self-efficacy in oral English learning. In terms of information technology, teachers can help students master operational skills through demonstrations. Concerning training materials, teachers can guide students in selecting real-life corpora. As far as pronunciation is concerned, teachers should consciously integrate phonetic instruction into their regular teaching, particularly in knowledge of pronunciation, phonetic symbols, and intonation.

4. Limitation

This study has some limitations to the generalization of the results. First, this study is limited to the first grade college students majoring in Computer science in the second semester of the academic year 2022-2023 of Guangzhou College of Commerce, Guangdong, China. There may be some differences in the results of the experiments for the students from different majors. For example, the general English proficiency level of accounting majors may be relatively higher than that of computer science majors, which may lead to an obvious disparity in the experimental results. Second, the experimental time is limited to 8 weeks which is relatively short for training oral English through ASE system to achieve greater progress. Third, this study only uses individual work in practising English pronunciation. The instructor is the researcher, which is not an ideal situation for experimental studies.

5. Recommendations

Based on the findings of the study, it is advised to use ASE in the curricula plans of English

language subject at schools. Meanwhile, teachers should pay attention to cultivating students' ability of self-reflection, attribution analysis, and problem-solving. Also, English language teachers may be trained to be able to use ASE in teaching oral English. Finally, we recommend that more research is needed in the area of teaching oral English via ASE. Additionally, it is also recommended that a more refined method of analysis be performed by different student subgroups, grade levels, and time.

6. Conclusion

In view of the importance of college oral English learning in the current development of society, this paper studies and explores a new way of oral English learning based on the FIF ASE System. The goal of the present study was to investigate the effectiveness of the ASE System in improving students' self-efficacy in oral English learning. The findings confirmed the value of the ASE System. The results revealed that EFL learners' oral competence level in accuracy and fluency indicated a significant improvement due to applying the ASE System over time. Moreover, the utilization of the ASE System as a means of oral English learning heightens the learners' level of self-efficacy. Next, Students also encountered many challenges when using the system, the biggest of which is their inability to identify pronunciation errors when the system gives them a low score for their oral performance. Finally, it is advised that students' self-efficacy in oral English learning can be significantly enhanced through the improvement of ASE System and active guidance of teachers. It can be expected that the application of FIF ASE System into college oral English learning will lay a solid foundation for the continuous development and improvement of teaching English.

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