

Research on the Construction and Application of ESP Hybrid Teaching Mode Based on "VR + SPOC": Taking the Course of Radiotelephony Communication as an Example

Huani Chen*, Cancan Tan, Zibin Yang

School of Foreign Languages, Civil Aviation Flight University of China, Nanchang Street, Guanghan, China

**Corresponding author*

Keywords: VR technology, SPOC, ESP, Blended learning mode, Teaching effectiveness

Abstract: In order to solve the pain point problems in teaching, many researches have been carried out on blended teaching. In this paper, "Radiotelephony Communication" course was taken as an example to expound the construction and application of ESP hybrid teaching mode based on virtual simulation technology and SPOC platform, and a comprehensive evaluation of the teaching effects was conducted. The study reveals that the ESP hybrid teaching mode based on "virtual simulation + SPOC" effectively solves the problems that "Radiotelephony Communication" teaching is detached from real flight scenarios, and students' language proficiency development is disconnected with professional ability cultivation. The ESP hybrid teaching mode based on "virtual simulation + SPOC" expands the depth and breadth of language application and forms an innovative language teaching mechanism of "language skills + professionalism" with aviation features.

1. Introduction

Blended learning is a combination of "online" and "offline" teaching, which combines the advantages of online teaching and face-to-face classroom teaching, has gradually become a new practice and norm for English teaching [1,2]. In 2009, Means proposed that the effect of blended learning is better than face-to-face or online teaching [3]. In recent years, many universities have been making efforts to promote the quality and efficiency of classroom teaching through carrying out "classroom revolution". "Radiotelephony Communication" is a course of English for Specific Purposes (ESP) for undergraduate students majored in flight technology of Civil Aviation Flight University of China. The teaching objective of which is to equip students with basic radiotelephony communication skills, to enhance students' comprehensive English proficiency of civil aviation, so that they can meet the language proficiency requirements of International Civil Aviation Organization (ICAO) for pilots.

As a compulsory English course for students of flight technology, the traditional teaching of Radiotelephony Communication has many problems, i.e. "Radiotelephony Communication" teaching is detached from real flight scenarios, and students' language proficiency development is

disconnected with professional ability cultivation. In order to solve the pain point problems in teaching, a hybrid teaching practice of radiotelephony communication has been performed since 2020 in Civil Aviation Flight University of China. In this study, a hybrid teaching mode of ESP based on “virtual imitation + SPOC” is constructed, and the course of Radiotelephony Communication is taken as an example to evaluate and analyse the effectiveness of this teaching mode, through which further references are expected to be provided for theoretical research and practice of ESP hybrid teaching.

2. The Establishment of Teaching Objectives for Radiotelephony Communication

2.1. Analysis of Teaching Problems

As an ESP course for students majored in flight technology, the traditional teaching of “Radiotelephony Communication” has the following problems: (1) The teaching of “Radiotelephony Communication” is detached from the actual flight scenarios, and it is difficult to combine the language teaching with flight training to meet the requirements of radiotelephony communication for international flights. (2) The traditional teaching assessment of “Radiotelephony Communication” course is singular, and students' learning achievements cannot be effectively evaluated. (3) There is a disconnection between students' language proficiency development and professional ability cultivation.

2.2. Establishment of Teaching Objectives

In response to the teaching problems mentioned above, the teaching objectives are formulated oriented to the cultivation of “language skills + professional abilities” in the following three dimensions:(1) Language learning: to be able to understand the standard phraseology, communication procedure and relevant background knowledge of English radiotelephony communication; (2) Skill acquisition: to be able to analyse various flight conditions and factors, communicate efficiently and accurately, and meet the ICAO requirements for English language proficiency of pilots in international and domestic flights; (3) Moral cultivation: to be able to establish a sense of professional identity and national pride, understand spirit and culture of contemporary civil aviation in China, and have situational awareness and cross-cultural communication awareness.

3. The Construction of ESP Hybrid Teaching Mode Based on “VR + SPOC”

In order to achieve the teaching objectives, a hybrid teaching mode of “Radiotelephony Communication” based on flight simulation software and Superstar SPOC platform is constructed, in which four aspects are involved: teaching content, teaching implementation, course assessment and technology support [4, 5].

3.1. Analysis of Target Students

Radiotelephony Communication is applicable to students of Civil Aviation Flight University of China who are majored in flight technology. Students have completed some aviation related courses (such as Aviation English Reading, Principles of Flight, etc.) before taking this course, and have been equipped with fundamental aviation English proficiency in listening, speaking, reading and writing.

3.2. Design of Hybrid Teaching

Based on flight simulation software and “Radiotelephony Communication” SPOC, an inquiry-based interactive “online+offline” hybrid teaching design of “Radiotelephony Communication” was completed in accordance with Douglas Kerr's BOPPPS model for curriculum design.

3.2.1. Teaching Content

The teaching content design is based on ICAO and CAAC documents related to radiotelephony communication phraseology, in which the requirements of pilots and air traffic controllers for radiotelephony communication and the civil aviation industry standards are fully integrated. In line with the actual flight procedures, the normal and abnormal radiotelephony communication phraseology and procedures of international flights are covered, so that learners can master the basic procedures and phraseology of radiotelephony communication to meet the industry requirements.

3.2.2. Teaching Implementation

The blended teaching Radiotelephony Communication consists of 3 seamless stages: pre-class online learning in Superstar platform and Tencent Conference, in-class offline classroom teaching incorporated with flight simulation software, and aft-class online learning in Superstar platform.

The pre-class online learning achieves the teaching objectives in terms of language learning. In this stage, the teacher organizes guided learning for students, who complete the online learning tasks in each lesson according to the learning task list on Superstar SPOC platform, through which the teacher effectively monitors students' learning process and effect, as well as the overall learning progress and effect of the whole class. The in-class offline classroom teaching (classroom instruction + flight simulation software) achieves the teaching objectives related to skill acquisition. Combined with the BOPPPS framework, the flipped classroom teaching mode is adopted and the flight simulation software is used to support a variety of participatory learning activities and create a variety of flight simulation scenarios, allowing students to experience the complexity and diversity of actual radiotelephony communication situations in an interactive and game-like learning environment by realizing the synchronization of language using and flight training. Realistic flight scenarios and operational environments are introduced into classroom teaching, allowing students to analyse multiple factors and integrate their aviation knowledge for effective communication, achieving the unification of language skill acquisition and flight training. During the aft-class online learning phase, the students' radiotelephony communication abilities are further strengthened and enhanced through post-tests and extended exercises. Through a series of progressive inquiry-based participatory activities, the teaching objectives have been achieved.

3.2.3. Course Assessment

The course assessment system is based on the concept of Outcome based education (OBE), and the course objectives and students' graduation requirements are the foundation for the designing the assessment system [6, 7]. The assessment system in the hybrid teaching mode of Radiotelephony Communication Course consists of two parts: process evaluation (40%) and summative evaluation (60%). The process evaluation is composed of the online learning performance (90%) and offline learning performance (10%). The online learning performance (90%) includes: check-in (5%), discussion (2%), chapter quizzes (8%), video watching (10%), classroom interaction (10%), exams (20%), and homework (35%). Offline learning performance (10%) are based on student completion of aft-class tasks. The summative assessment is an offline test with a variety of questions, namely

Multiple Choices (10%), Listening Comprehension (30%), True or False (10%), Sentence Dictation (15%), Role-play (20%), and English-Chinese Translation (15%). The assessment of “Radiotelephony Communication” hybrid teaching involves the whole learning process of “online + offline”, including pre-class learning, in-classing learning and aft-class learning, forming a multi-dimensional evaluation system.

3.3. Technology Support

The technology support mainly includes two aspects: flight simulation software and SPOC platform. Relying on Superstar, the SPOC platform of Radiotelephony Communication was reconstructed and teaching resources were optimized, on which the blended course syllabus was reformulated, the blended course teaching plan was prepared, the audio and videos of the new teaching materials were recorded, the blended teaching electronic courseware was produced, and the course exercises and examination question bank were constructed.

Each lesson of the online course platform mainly includes six modules, namely, pre-class learning guidance, teaching video, text study, homework, 900 sentences practice and extended learning, etc. The lesson structure of introduction, micro lecture, text learning and practice is established, so that learners can learn Radiotelephony Communication progressively. In terms of content arrangement, it extends from standard phrases to ICAO English, covering radiotelephony communication in routine, non-routine and emergency situations reflecting the combination of internationalization and localization. Relying on the flight simulation software and the SPOC platform, the classroom is flipped by using situational teaching, game teaching and case teaching, creating a “VR + SPOC” hybrid teaching mode of “Radiotelephony Communication”.

4. The Application of Hybrid Teaching Mode of “Radiotelephony Communication” Based on “VR + SPOC”

4.1. An Overview of the Application of the Hybrid Teaching Mode for Radiotelephony Communication

Since 2020, a hybrid teaching mode based on “VR + SPOC” in the course of “Radiotelephony Communication” for students majored in flight technology has been applied in Civil Aviation Flight University of China to further enhance pilot students' Radiotelephony Communication proficiency in English to meet the requirements of international flight operations. In the first semester of 2020 (2019-2020-2), six classes from the School of Flight Technology were selected as the experimental classes to implement the hybrid teaching experiment, through the process of which the research team continuously improved the teaching organization and implementation plan based on student feedback. On this basis of the first round of experiment, the blended teaching practice is further promoted in the second semester of 2020 (2020-2021-1), and a blended teaching practice of “Radiotelephony Communication” is implemented for another 10 classes from the School of Flight Technology.

4.2. Effectiveness of the Hybrid Teaching in Radiotelephony Communication

This study examined the effectiveness of the hybrid teaching in Radiotelephony Communication in two main dimensions: students' satisfaction and academic performance. Due to the relative small sample size in the first semester, only the data from the second semester were used in this research to assess the effectiveness of the hybrid teaching.

4.2.1. Analysis of Students' Satisfaction

A questionnaire to evaluate the satisfaction of the students was prepared for this study by taking into consideration of all the influencing factors of satisfaction with blended teaching. The questionnaire mainly covers five dimensions: learners' personal information, learning environment, degree of interaction, learning achievement and satisfaction (Wei-Tong Liu, Xiaoxiao Wang 2019). The questionnaire was distributed and collected through internet, and a total of 329 valid questionnaires were retrieved. The overall reliability and validity of the questionnaire was analysed using SPSS19, and the questionnaire reliability Cronbach. α is 0.991 (as shown in Table 1) and validity KMO is 0.964, which indicate that the questionnaire has a high reliability and validity. The mean values of the four dimensions of the questionnaire, such as learning environment and degree of interaction, were greater than 3.7, all of which were statistically significant ($p < 0.05$), which indicated that students had a relative high degree of satisfaction with the hybrid teaching mode of "Radiotelephony Communication" based on "VR + SPOC". Among all the questionnaire items, the mean values of item 27 (You are satisfied with the teaching ability of the teachers in the hybrid teaching mode), and item 28 (you are satisfied with the teaching attitude of the teacher in the hybrid teaching mode) are the highest, which are 4.09 and 4.11 respectively, indicating that students' satisfaction with the teaching in the blended mode is high. The mean value of item 9 (The hybrid teaching format of the course provides more freedom in terms of time and space" is relatively low at 3.79, indicating that students may feel the teaching platform of this course is not flexible enough and should be improved.

Table 1: Reliability analysis

Sample size	Number of items	Cronbach's alpha coefficient
329	25	0.991

4.2.2. Assessment of Academic Achievements

Table 2: Comparison of final test scores of experimental and non-experimental classes

	Levene test of variance equation		t Test of average equation						
								95% confidence interval of difference	
	F	Sig	t	df	Sig(bilateral)	Average difference	Standard difference	Lower limit	Upper limit
Assumption of equal variance	18.128	.000	9.276	1400	.000	7.13824	.76951	5.62872	8.64776
Assumption of non- equal variance			10.074	853.161	.000	7.13824	.70857	5.74750	8.52898

The analysis of academic performance involved a comparison of the final test score for Radiotelephony Communication Course between the experimental and non-experimental classes. Independent sample t-tests were conducted on the final test scores using SPSS19 and the results are shown in Table 2. The mean value of the final test scores was 69.6 for the experimental class and 62.46 for the non-experimental class, $p = 0.000 < 0.05$. The results of the data analysis indicated that there was a significant difference between the experimental and non-experimental classes' scores in the final test of the course, and the experimental classes outperformed the non-experimental classes in the final test. This indicates that the blended teaching of Radiotelephony Communication has effectively improved students' learning performance.

5. Conclusions

The hybrid teaching practice of “Radiotelephony Communication” is oriented to the cultivation of “language skills + professionalism” based on flight simulation software and the SPOC platform of “Radiotelephony Communication”, real flight scenarios and operating environments are incorporated into classroom teaching and the combination and unification of language skills and professional practice are realized. Through in-class lectures, interactive communication and inquiry discussions, the hybrid teaching practice activates the traditional classroom, and improves the classroom teaching quality and efficiency. The ESP hybrid teaching mode based on “VR + SPOC” expands the depth and breadth of language application and forms an innovative mechanism for language teaching with industry characteristics of “language skills + professional literacy”.

References

- [1] Cao Ying. *A quantitative analysis of international ESP research*. *Journal of Foreign Languages*, 2017, (6): 90-94.
- [2] Guan Enjing. *Research and Practice on Evaluation of Blended Teaching Effectiveness*. Beijing: Tsinghua University Press, 2018.
- [3] Means B, Toyama Y, Murphy R, et al. *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. U.S. Department of Education Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service, 2009: 9-11.
- [4] Liu Weitong, Wang Xiaoxiao. *A study on the factors influencing the satisfaction of blended teaching*. *Modern Educational Technology*, 2019, 29 (01): 107-113.
- [5] Michael Horn, Heather Steck, Nie Fenghua, Xu Tiying. *Blended learning: Driving the education revolution with disruptive innovation*. Beijing: Machinery Industry Press, 2015.
- [6] Lv Tingting, Wang Na. *Research on flipped classroom teaching mode based on SPOC+ digital teaching resource platform-Taking college English for example*. *China's electrification education*, 2016, (5): 85-90.
- [7] Wang Lijuan. *Exploring the Problems and Strategies of Teaching English for Special Purposes*. *Foreign Language World*, 2016, (6): 57-63.