

EAP Creative Course Based on Blended Learning: Design and Evaluation for Top STEM Students

Li Zhang

School of Foreign Languages and Literature, Shandong University, Jinan 250100, China

Abstract

This paper discusses the teaching model, course design, evaluation method and teaching results of English for Academic Purposes (EAP) creative course for top STEM students of Taishan College, Shandong University. EAP creative teaching adopted the innovative methods of blended learning and the combining task-based modularization, took into account students' needs and interests in subject research, and aimed to improve students' comprehensive ability of academic English. The teacher made use of the diversity of network resources, the autonomy of online learning and the humanity of classroom teaching to improve students' learning competencies and effect, so as to make this English course serve professional academic research. The results of a case study showed that there were significant differences in the total scores, listening scores and reading scores between the creative class and the traditional class.

Keywords

EAP, CREative teaching, Top STEM students, Blended learning, Teaching modules.

1. Introduction

English for Academic Purposes (EAP) aims to help learners adapt to English mediated learning and Research [1]. EAP creative teaching is a blended learning mode designed for English learners preparing for academic research, through which learners can learn a set of language skills for effective communication in an academic environment. Because EAP belongs to English for Special Purposes (ESP), the expected teaching objectives of EAP creative teaching are higher than the learning objectives of basic language skills of English as a Second Language (ESL). Overall, the teaching task of EAP creative course is to take teachers as guidance and students as the main participants, focus on cultivating students' comprehensive academic English abilities, and provide linguistic services for students' professional research.

Traditional teaching mode mainly refers to the test-driven teaching mode formed and widely used in China's long-term education and teaching practice. Its remarkable features are teachers' long lectures and students' passive listening, with teachers as the center and authority. On the contrary, EAP creative teaching connects academic English learning with students' career development and focuses on improving students' initiative. Therefore, compared with the traditional teaching mode under which students blindly pursue high test scores, creative mode can help students experience the value of learning.

EAP creative course was taught to about half of the freshmen of Taishan College, Shandong University, China. Taishan College, named after Mount Tai (Taishan) in Shandong Province, China, was established by Shandong University in 2010 in order to practice the "Experimental Plan for Training Top STEM Students" [2] and to accelerate the training of top-notch students majoring in mathematics, physics, chemistry, life science and computer science. Students of Taishan College are selected annually through single-subject examinations and interviews within the scope of all the freshmen in Shandong University during the one-month military training at the beginning of the first semester. Students of Taishan College performed highly in

Gaokao (the National College Entrance examination of China), and their English are also at a relatively high and consistent level. EAP creative teaching was designed for students of Taishan College. It aimed to take students' needs as the starting point of teaching by adopting blended learning mode. It aimed to explore an innovative and more effective teaching method.

2. Teaching Model: Blended Learning

Blended learning combines the characteristics of traditional classroom face-to-face teaching and network teaching, and organically integrates the two teaching methods through effective teaching design and technical support [3, 4, 5]. Thus, it combines the advantages of online teaching and face-to-face teaching. For example, students can enjoy easy sharing of resources, and the interactivity of classroom teaching is also enhanced owing to online sharing before class [6]. Blended learning has been regarded as an important teaching mode to overcome the limitations of traditional teaching or pure online teaching [7, 8]. It is the integration of traditional and novel learning methods [9], is transformative and can enable educators to re-examine and reconstruct teaching practice [10].

Blended learning can not only significantly promote students' performance, but also improve students' learning motivation [11]. Students who participated in the blended learning of online courses and face-to-face courses performed much better than those who only received online courses or face-to-face classroom education [12]. At present, teachers at Shandong University can use several online teaching and learning platforms for free, such as Rain Classroom, Massive Open Online Courses (MOOC), Modular Object Oriented Dynamic Learning Environment (Moodle), etc. to create online course models on their own. Rain Classroom was the platform employed by the author, which can not only allow teachers to design their class and realize online and offline teacher-student interaction, but also open a large number of teaching resources of various disciplines to both teachers and students.

3. Online Learning Strategies

EAP Creative teaching needs the support of online resources of various disciplines, especially those related to students' majors. Different from many Chinese college students who could not choose their favorite major because of their low scores in Gaokao, top STEM students of Taishan College all applied voluntarily and were admitted on the basis of merit. Therefore, their study has a strong discipline-based research purpose, so as for English learning, they will show a high degree of enthusiasm and autonomy when undertaking tasks such as writing research papers and publishing academic achievements on the field of study they have chosen. In view of this, EAP creative teaching adopted diversified resources for different majors to promote students to improve their English application and academic research by effectively using online big data and online/offline interpersonal communication.

The online learning resources released by the teacher of EAP creative class included not only text and audio-visual materials, but also many professional online resource websites, online journals, online conference report links, etc. Students had much autonomy to choose appropriate learning tasks according to their English level and professional needs. This "semi-proposition" task-based learning method could not only ensure the professional orientation of academic English materials, but also promote students to study different types of online tools, and exercise to use these tools to collect, screen and sort out information, and independently create learning activities to carry out academic research and exploration using network information technology.

Although online learning allowed students to manage their time and choose materials according to their linguistic and cognitive abilities, majors and learning rhythm, so that they could study and complete tasks independently, in practice, however, online supervision,

guidance and Q & A of teachers were also essential. The teacher of the creative class set task completion indicators through the online platform, supervised students' learning progress and task completion, timely encouraged or urged students according to their performance, and gave guidance and explanation when students encountered difficulties and questions, so as to ensure that no students "fell behind."

4. Course Design and Modules

4.1. Course Design

EAP creative course was designed around how to make a small number of English teachers help a large number of STEM students of different majors become effective users of academic English in a short period of time. It aimed to make English teachers pay attention to students' different professional needs in the process of their teaching and guidance, help students to obtain academic information in English, participate in English academic activities, and use the learning results of the EAP course to support their academic research.

The teaching activities of EAP creative course included the learning activities that learners completed relatively independently (with or without the teacher's guidance according to personal needs) in the network environment and the interactive teaching links between teachers and students completed in the classroom. The following figure provides the specific teaching design (see Fig. 1).

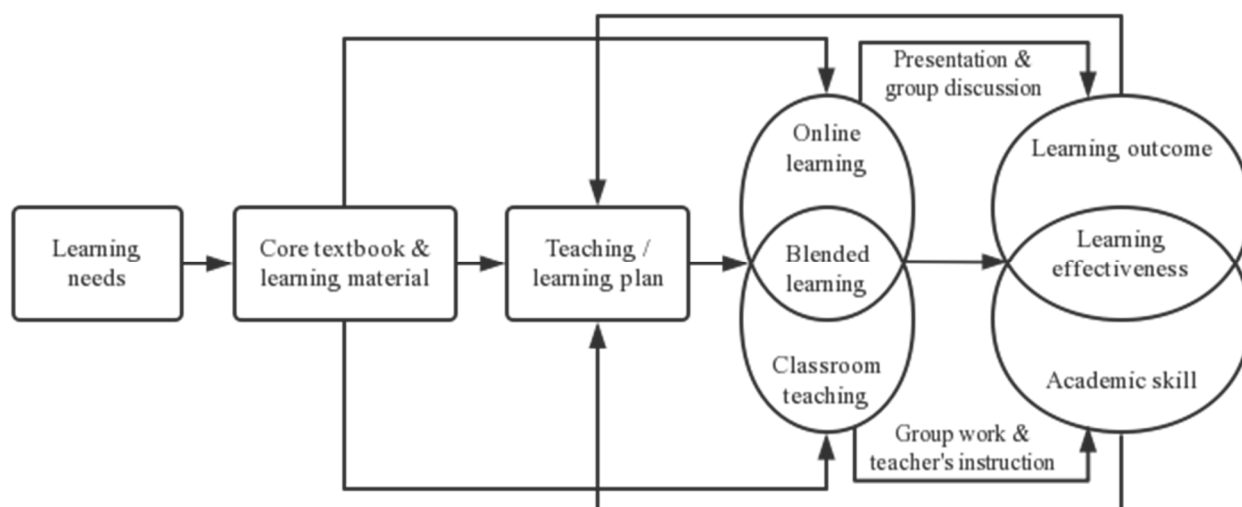


Figure 1. EAP Creative Course Design

As shown in the above figure, EAP creative teaching took the needs of students as the starting point, used one academic English textbook designated by the Department of College English Teaching, Shandong University for academic English course as the core teaching material with supplementary teaching materials related to students' majors. EAP creative teaching plan is student-centered. Through students' independent research and interaction with teachers and classmates, students' use of academic English has been comprehensively trained and improved.

4.2. Teaching Modules

Using appropriate teaching methods can stimulate students' learning motivation and change students' learning attitude and behavior [13]. Therefore, focusing on students' knowledge construction, EAP creative class employed task-based modular teaching which was divided into three teaching modules: basic, intermediate and advanced. The course lasted for 14 weeks. The

first week was for the pre-test, the last week is for the post-test, and the middle 12 weeks were the teaching weeks, four weeks per module. Each module focused on the cultivation of one or two special technical English abilities and had multiple learning tasks. Through the use of teaching modules, the focus of the instruction had shifted away from the teacher's knowledge transmission to students' active learning.

The first module was the basic module, focusing on developing students' academic reading ability. It involved training students' reading skills (such as understanding text structure, understanding data, charts and tables, understanding references), the ability to understand meaning (including deriving word meaning, understanding the relationship between sentences, understanding information and understanding conceptual meaning, etc.), sentence and text comprehension (including understanding the value of sentences, understanding relationships within text through vocabulary, deixis and cohesive devices, understanding the use and meaning of punctuation, etc.) and efficient reading skills (including skimming to obtain key points, scanning to locate specific information, using topic sentences to speed up text reading, understand the text through introduction and conclusion, etc.).

In teaching practice, the teacher first issued online learning tasks on the teaching platform (Rain Classroom), uploaded supplementary reading materials related to students' majors, offered journal article suggestions or database links, etc. so that students can choose the appropriate reading materials according to their majors or academic interest. At any time, the students can submit the problems encountered during their online learning to the online platform (Rain Classroom), so that the teacher could provide timely answers before classroom teaching. The teacher also gathered in advance the more centralized and difficult problems students asked during online learning and analyzed them later through face-to-face teaching in class. One of the main tasks of classroom teaching is to expand and extend the online task. Another key task of classroom teaching was to carry out in-depth reading analysis by reading the passages in the core textbook and encourage students' to compare them with the relevant materials they read online, arousing their critical thinking. As for the third task, students present their online learning results through group activities under the guidance of the teacher.

The second module is the module of improvement, focusing on developing students' academic listening and speaking skills. Although academic listening and speaking activities run through the course, the purpose of this module is to provide students with special training in academic listening and speaking abilities by means of mock academic seminars. The competence focused upon included audiovisual skills (e.g., selective extraction of relevant points, ignorance of secondary information), notebook skills (e.g., shorthand, use of abbreviations and symbols), speech comprehension skills (e.g., recognition of spoken language forms, understanding of tone and pronunciation emphasis, identification of iconic words, recognition of speaker's attitude) and critical information evaluation skills (e.g., identification of speech structure, identification of major ideas and supporting materials, critical audiovisual assessment).

Through sufficient online video observation and classroom discussion, students had a clearer understanding of the content and language expression involved in the seminar activities, made sufficient and accurate notes on the academic reports they hear, and displayed and discussed the academic reports in English. Skills trained for academic seminars includes presentation skills (e.g., presentation structure, introduction to topics, expression of intent, descriptive ability, key points of explanation and examples, emphasis and explanation of key points, summary, checking listening effectiveness, inviting others to participate), discussion skills (e.g., polite interruptions, questions and counseling, support and disagreement, suggestions, checking others' understanding, preventing interruptions) and chairing a discussion (e.g., leading, changing or continuing topics, urging and accelerating, drawing attention and drawing conclusions).

In teaching practice, the teacher sets learning tasks by adopting a step-by-step strategy, that is, first observe and then practice. For example, in the viewing stage, the teacher suggested audio-visual materials or web links of academic reports related to students' specialties through the web-based teaching platform, and asked students to choose one for viewing, listening and analyzing, make records and prepare short class reports. The teacher made comments and used core textbooks to further explain academic listening and speaking skills in classroom teaching and organized mock academic seminars. It was essential that the teacher guided group activities throughout to ensure everyone's participation.

The third module is the advanced module. This module focuses on developing students' academic writing skills, including technical skills (spelling and punctuation, charts and tables, vocabulary and grammar, etc.), expressive skills (defining, classifying, comparing and contrasting, reporting, etc.), process description skills (expressing purpose, descriptive means and methods, describing development and change, describing a series of processes and relationships, etc.). It also involves the ability to develop arguments (including stating arguments, ideas and opinions, supporting arguments, refuting opinions, making evaluations, drawing conclusions, etc.) and the ability to write articles (such as structure organization, summary writing, introduction and conclusion writing, complete paper writing, academic format, paper revision and proofreading).

In practice, the teacher first assigned writing tasks, and set them in stages, from simplicity to complexity, and from part to whole. She gradually required students to write abstracts, background and objectives, conclusions and finally complete short papers. Students wrote according to the requirements, referring to online materials provided by the teacher and specialized materials sought by themselves. The teacher asked students to submit papers online before class, conduct case studies in class, further explained the language, structure and skills of academic writing, and discussed with students.

5. Evaluation of Teaching Effect

5.1. Method

The research target was all freshmen of Taishan College, Shandong University in 2021, among whom 42 students were in EAP creative Class as the experimental group and 43 were in traditional Class as the control group. The course duration is the autumn term in 2021, totaling 14 weeks, and both classes have 48 class hours for classroom teaching and the same exam papers were used.

In order to explore the effect of EAP creative teaching on College Students' learning, students both in creative class and traditional class have taken pre-test and post-test. The test questions in the test question bank of EAP course were adopted. The test contents included listening comprehension (30 points), language and structure (30 points) and 40 reading comprehension (40 points). All questions were one-way multiple-choice questions, completely avoiding the interference of subjective factors of the examiners. SPSS 23 was used to conduct independent sample t-test on the scores of the two tests (Table 1). The independent sample t-test took 95% as the confidence interval and the formula Cohen's $d = \frac{M_1 - M_2}{\sqrt{\frac{SD_1^2 + SD_2^2}{2}}}$ was used to calculate the

effect size. The interpretation criteria are $.2 \leq d < .5$ (small effect), $.5 \leq d < .8$ (medium effect), and $d \geq .8$ (large effect). The test questions are from the test question bank of EAP course constructed by Shanghai Jiaotong University Press.

5.2. Results

Table 1 Achievements Analysis Through Independent Samples *t* Test

		Creative (n=42)	Traditional (n=43)	<i>t</i>	<i>p</i>
Total Score	Pre-test	62.33±6.14	62.30±5.73	.024	.981
	Post-test	84.26±5.73	81.63±6.07	2.056	.043
Listening	Pre-test	14.17±2.07	14.19±2.04	-.043	.965
	Post-test	24.10±1.94	23.19±2.00	2.128	.036
Language & Structure	Pre-test	23.88±1.77	23.91±1.85	-.066	.947
	Post-test	25.88±1.73	25.35±1.88	1.359	.178
Reading	Pre-test	24.29±2.39	24.21±2.12	.156	.876
	Post-test	34.29±2.22	33.09±2.31	2.427	.017

5.2.1. Pre-test Results

Perhaps due to the students' lack of training on academic terms and expressions, the total average scores and the scores of each test item of the two classes were close and not high. The average scoring rate of creative class was 62.33% and the average scoring rate of traditional class was 62.30%. Among the three test items, listening comprehension got the lowest scoring rates, with 47.23% in creative class and 47.30% in traditional class. The scoring rates of reading comprehension were at the medium level, with about 60% in both classes. The scoring rates of language and structure were the highest in the two classes. The scoring rates of creative class and traditional class were 79.60% and 79.70% respectively.

From the pre-test results of EAP creative class and traditional class in Table 1, it can be seen that there were very little differences between the mean of pre-test total scores, listening comprehension scores, language and structure scores and reading comprehension scores of the two classes (.03, -.02, -.03, .08), indicating that the students in both classes have considerable English proficiency and English learning ability, which can be used in group experiments with different teaching and learning methods. Moreover, students in Taishan College have a solid foundation in the application of common English vocabulary and the mastery of English grammar.

5.2.2. Post-test Results

After EAP learning for one semester, the students of the creative class and traditional class took academic English post-test. Using the same question types and difficulty as the pre-test, the post-test results can objectively reflect the students' Academic English level.

The post-test score statistics showed that the average score of the creative class was significantly higher than the average score of the traditional class (84.26, 81.63). The mean scoring rates of listening comprehension, language and structure and reading comprehension in creative class were 80.33%, 86.27% and 85.73% respectively. The average scoring rates of listening, language and structure and reading in the traditional class were 77.30%, 84.50% and 82.73% respectively.

5.2.3. Results Analysis

The post-test scoring rates of the three test items in the creative class were all more than 80%, the post-test scoring rates of language and structure and reading in the traditional class were more than 80%, and the scoring rate of listening was 77.30%, which was the lowest of all in post-test scores. Compared with the scoring rate of the three test items of the two classes, the listening scoring rate of the creative class in the pre-test was lower than that of the traditional

class, and the scoring rate of the three test items of the creative class in the post-test was all higher than that of the traditional class.

The independent samples *t*-test indicated that creative class had a mean of 62.33 pre-test total points ($SD = 6.14$), traditional class had a mean of 62.30 pre-test total points ($SD = 5.73$), and the means did not differ significantly at the $p < .05$ level, $t(83) = .024, p = .981 > .05$. It could be found that before the implementation of the teaching experiment, the difference in the means of total scores of the students in the two classes was only .03. However, the difference between the average post-test total scores of the creative class and the traditional class was 2.63. The difference between post-test total scores of the creative class ($M = 84.26, SD = 5.73$) and that of the traditional class ($M = 81.63, SD = 6.07$) was significant, $t(83) = 2.056, p = .043 < .05, d = .45$. The average total score of the post-test of EAP creative class was 35.18% higher than that of the pre-test, and the average total score of the traditional post-test was 31.03% higher than that of the pre-test.

The pre-test listening score of creative class ($M = 14.17, SD = 2.07$) is lower than that of the traditional class ($M = 14.19, SD = 2.04$) and there was not significant difference between the two samples, $t(83) = -.043, p = .965 > .05$. After the implementation of experimental teaching, the average listening score of creative class was .91 points higher than that of traditional class. There was a significant difference between the post-test listening score of creative class ($M = 24.10, SD = 1.94$) and that of the traditional class ($M = 23.19, SD = 2.00$), $t(83) = 2.128, p = .036 < .05, d = .47$. The post-test listening score of creative class was 70.08% (9.93) higher than that of the pre-test and the traditional class increased by 63.42% (9.00).

The pre-test reading score of creative class ($M = 24.29, SD = 2.39$) was .08 points higher than that of the traditional pre-test ($M = 24.21, SD = 2.12$), and the difference between the two samples was not significant, $t(83) = .156, p = .876 > .05$. The post-test reading score of creative class ($M = 34.29, SD = 2.22$) was higher than that of the traditional ($M = 33.09, SD = 2.31$) by 1.20, and the difference was significant, $t(83) = 2.427, p = .017 < .05, d = .53$. The post-test reading score of creative class was 41.17% (10.00) higher than that of the pre-test, and that of the traditional class was 36.68% (8.88).

In terms of language and structure, the mean scores of pre-test of the creative class was .03 point lower than that of the traditional class, but .53 point higher in the post-test. Compared with the two test scores of the same class, the language and structure score of the post-test of the creative class increased by 8.38% (2.00) and that of the traditional class increased by 6.02% (1.44). Independent sample *t*-test showed that there was not significant difference between the pre-test language and structure scores of creative class ($M = 23.88, SD = 1.77$) and that of traditional class ($M = 23.91, SD = 1.85$), $t(83) = -.066, p = .947$. The difference between the post-test score of language and structure in creative class ($M = 25.88, SD = 1.73$) and that of traditional class ($M = 25.35, SD = 1.88$) was not statistically significant either, $t(83) = 1.359, p = .178$.

6. Discussion

The results of the post-test are generally positive, indicating that the total scores of students in the creative class are significantly higher than those in the traditional class, especially in listening and reading comprehension. This may be ascribed to the instructional design. The students in the innovation class employed the methods of autonomous learning and cooperative learning, and use more optional learning resources. Therefore, their learning initiative and learning effect have been significantly improved, especially in the part of listening, which is a common weakness of Chinese English learners. Besides, the teacher in creative class adopted a variety of teaching activities to promote students' advanced cognitive activities and

effectively enhance students' aural comprehension and speaking ability as well as the faculty of understanding.

In contrast, students in traditional class paid more attention to the mastery of English grammar and knowledge points in the learning process. Through low cognitive learning activities such as reciting English words, oral imitation and text retelling, students' learning process is more mechanical. Students were more often than not in a passive position. In this case, the mean score of each test item has been improved, their rise is smaller, because students' learning highly relied on the traditional "inculcation-oriented" and "examination-oriented" teaching methods, which is one-sided and cannot fully stimulate students' creative thinking and comprehension.

It should also be mentioned that whether EAP creative teaching mode is conducive to improving students' writing and translation ability needs to be further proved through reasonable teaching evaluation design and teaching practice.

7. Conclusion

Designed for top STEM students, EAP creative course based on blended teaching mode was a practical teaching practice centered on students' needs. It could not only improve students' basic language skills, reaching the goal of learning English as a foreign language, but also improve the comprehensive academic English ability of the top STEM students. The employment of blended learning and task-based modular teaching effectively enhanced students' learning motivation, learning ability and learning effects. EAP creative teaching design combined English learning with students' majors, which not only gave play to students' subjectivity and improved learning results, but also made English courses serve students' professional academic research. Results showed that the overall performance of students in creative class was higher than that of traditional classes. It is worth mentioning that in the part of listening comprehension, which is a common English learning difficulty for Chinese students, students in creative class have also made higher achievements.

Due to the limited practical experience at present, the method and scope of application of EAP creative course need to be further explored and expanded. But the author believes that EAP creative course is of great benefit not only to the improvement of top STEM students' comprehensive academic English ability, but also to the professional growth of teachers who teach them. Whether creative teaching can be widely used in College English teaching is a subject to be explored in the further study.

Acknowledgments

This work was supported by the fund of Teaching Program of Shandong University entitled "A Study on College English Deep Learning Oriented Teaching Model for Top Students" (program number 2022Y332).

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