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Methods of Improving and Optimizing English Education Level in Higher Vocational Colleges Under the Background of Big Data

Yuan Teng, Hebi Automotive Engineering Professional College, China*

ABSTRACT

At present, the English skills of Chinese university graduates cannot meet the needs of social development. Therefore, in recent years, the reform of college English teaching has received unprecedented attention. This article proposes methods for improving vocational English education in the context of big data, including teacher development, curriculum design, teaching modes, teaching resources, and learning evaluation. It also explores and analyzes new models and means of vocational English teaching that are conducive to big data analysis. We adopted a blended learning model that combines large-scale online open courses and SPOC to reform traditional English teaching methods and plans, and studied the teaching effectiveness and feasibility of the blended learning model. The results indicate that it can improve the online course experience and teaching effectiveness. This study promotes the modernization and reform of vocational English education, which helps to enhance students' independent English learning ability and practical work ability.

KEYWORDS

Big Data, Education Level, English Teaching, Evaluation and Analysis, Hybrid Teaching Model, Teaching Reform

Under the impact of the big data era, humanity has gained unprecedented opportunities and conditions to access and utilize complete system data in multiple fields, thereby revealing knowledge that was previously difficult to access in the real world. The popularization of knowledge and the convenience of learning have become prominent features of today's society, and the openness of educational resources has also become increasingly prominent. With the popularity of the Internet and mobile devices, traditional face-to-face classroom teaching has gradually decreased, while experimental and interactive teaching has been greatly enhanced. In this context, tailored to teaching objectives, needs, and models, designed and managed courses should meet the actual needs of university teaching. This adjustment will enhance the quality of college English courses, better meet the needs of students for high-quality and diversified English language teaching, and benefit them for a lifetime. Especially for students in vocational colleges, this optimization will help them easily cope with English language challenges in future work and life, improve their practical work abilities, optimize vocational English

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language education in the context of big data, and propose feasible and effective methods and approaches from multiple perspectives, such as teacher development, curriculum design, teaching models, teaching resources, and learning evaluation. The authors delve into new models and methods of vocational English teaching that are conducive to big data analysis.

LITERATURE REVIEW

Assessment should not be a summative exercise, but rather a process. By using a classroom observation terminal that can record student learning at any time and aggregate the data, teachers can quickly identify where students are missing out on learning, which, in turn, helps them to reflect on their teaching activities in order to improve the relevance and effectiveness of their classroom teaching (Cui et al., 2023). The recording of pupils' behavior by an information-based curriculum vehicle enables the integration of big data into classroom teaching (Capogna, 2023). Big data can help teachers better manage and allocate teaching resources, and improve teaching efficiency and quality. By analyzing student learning data, teachers can identify which teaching resources are more popular among students and which teaching methods are more effective. Based on these findings, teachers can optimize the allocation of teaching resources, choose more suitable textbooks and teaching methods for students, and improve teaching effectiveness. At the same time, big data can also help teachers achieve the sharing and collaborative work of teaching resources, promote communication and cooperation among teachers, and improve the overall quality of teaching (McCray et al., 2023).

Big data has a disruptive impact on individual teachers' teaching. While traditional university English teaching is a textbook-based classroom that teaches basic knowledge and skills, the widespread use of the Internet makes it possible to use online platforms that students encounter when learning English. Although students today have abundant resources to learn English, they act as disseminators of knowledge and skills, organizers and participants in teaching activities. There are problems with the English teaching mode, teaching resources, and evaluation methods in the education system, which have failed to effectively cultivate students' English language abilities. Students lack sufficient practical opportunities and interactive teaching experiences, leading to difficulties in using English in practice.

The application of big data can not only optimize teaching content and methods, but also promote interaction and communication between teachers and students. By building a teaching interaction platform based on big data, teachers can understand students' learning dynamics and feedback in real time, and adjust teaching strategies in a timely manner; Students can also share their learning experiences on the platform, and interact with teachers and classmates. These online education platforms enable students to access quality educational resources from the world's leading universities. In today's increasingly popular digital education, MOOC (Massive Online Open Course) has been favored by teachers, students, and social learners for its open, shared, and convenient characteristics. However, the international MOOC platform may have some discrepancies in content and form with the local educational environment and student needs, where students can selectively watch videos repeatedly and adapt them for personalized learning, and where multi-format approaches, such as videos, provide better learning outcomes than simply reading textbooks.

Students have free rein over their own time, direction of study, content, and research progress (Purwati, Ubaidillah, & Restall, 2023). MOOC courses are designed not only for personal computers but also for mobile app terminals to distribute instructional videos for students' independent learning. Materials designed for MOOC courses can show students the most vivid expressions of English in their lives and work. In the process of moving towards Society 5.0, the importance of intelligent management is becoming increasingly prominent. In order to achieve more efficient, accurate, and sustainable management, advanced diagnostic (AD) systems close to zero faults have become a key technical support. Walsh et al. (2023) analyzed various gaps in the core management process of this system. Ensuring low-risk operations in various environments, thereby ensuring quality and sustainability. Xu, Yeyao, and Shabaz (2023) analyzed the near zero fault characteristics of AD systems

and their powerful predictive and warning capabilities. By comparing and analyzing historical and real-time data, the system can predict potential equipment failures, market fluctuations, and other risk events, and issue early warnings. This allows managers enough time to develop response measures to avoid or reduce the occurrence of risk events. Nahotko et al. (2023) classified data by measuring the distance between different data points. If most of the k nearest neighbors (KNN) of a sample in the feature space belongs to a certain category, then the sample also belongs to that category. The KNN method does not require a model to be established, but classifies by storing the training dataset or dividing the feature space based on the training dataset. Hulsen et al. (2023) further analyzed the factors that affect classification accuracy. They found that factors such as the size of the dataset, the correlation between features, and noise levels could all affect the performance of classification methods. Therefore, when choosing a classification method, it is necessary to weigh the specific application scenarios and data characteristics. Alshahrani et al. (2023) utilized high-definition audio and video technology to enable students to experience an immersive music atmosphere in remote learning. Through real-time interactive tools, teachers can communicate and answer questions with students at any time. The intelligent teaching platform can provide personalized learning resources and recommendations based on students' learning progress and interests. Hassani and Silva (2023) suggested that strengthening teacher training is a necessary measure to optimize higher VC music education. Through regular training and learning, teachers can master the basic skills and methods of digital teaching, understand the latest educational technologies and tools, and enhance their digital teaching ability and innovation awareness. Kaur and Sharma (2023) believe that teachers are an important driving force for higher VC music education. In the contemporary context, teachers should possess the ability and literacy of digital teaching. Therefore, strengthening teacher training is a necessary measure to optimize higher VC music education. Zhang et al. (2023) enable teachers to master the basic skills and methods of digital teaching through regular training and learning to enable them to understand the latest educational technologies and tools, enhance their digital teaching abilities, and innovative awareness. Maroufkhani, Iranmanesh, and Ghobakhloo, 2023) established a feedback mechanism to provide timely evaluation results and suggestions to students and teachers, promoting their continuous improvement and enhancement.

In recent years, MOOC has become a hot spot in higher vocational institution research. Due to its powerful data storage capacity, big data can enable students to make better use of it. Regarding Massive English learning resources: the M in MOOC is Massive and C refers to Course. The development history of MOOC has not come very far; the term first appeared in 2008, introduced by senior researcher, Bry Alexander, based on online teaching practice (Fanelli et al., 2023). Stephen Downes and George Siemens' online courses, based on connectionism and connected knowledge design, classify them into cMOOCs based on connectionism and xMOOCs based on behaviorism (Horng et al., 2023).

Soliman et al. (2023) argues that a MOOC is a course that brings together learning resources and learners on the web. Moraes et al. (2023) argue that a MOOC refers to a course with a large number of learners or a large and rich range of course activities. Karim, Antoni, and Oktarina (2023) argue that a MOOC is a formative course oriented towards learning structures, resources, and assessment strategies. Moraes et al. (2023) argue that a MOOC is a web-based process of processing and integrating experts, scholars, and accessible web resources in a field, and communicating and sharing them through multiple media. Nguyen, Sermpinis, and Stasinakis (2023) argue that MOOCs are courses with tens of thousands of registered students, and have great potential for data-driven educational research. Li and Li (2023) consider MOOCs to be online courses designed to engage learners with a wide range of interests based on a specific topic to complete. The European Partner MOOC Consortium considers MOOCs to be online, open, free, and complete courses designed for learners without identity requirements, which can be taken by any learner at any time and from any location via the Internet.

AbuKhousa, El-Tahawy, and Atif (2023) considers MOOC to be an online course in which the main instructor is responsible, with large-scale learners participating, through email announcements, lecture videos, homework exercises, forum discussions, online tests, and other constituent elements. MOOC courses are planned and organized web-based platforms offering teaching and learning activities based on digital resources, training objectives, learning needs, and knowledge systems, using information technology and flexible and effective learning modes, and supporting multiple learning objects and learning terminals.

MOOC is a large-scale, open, online course aimed at providing free global education for anyone who wants to participate in social learning; SPOC, on the other hand, is a private online course aimed at small-scale learning groups, suitable for specific learning goals and needs. Therefore, the main difference between the two lies in the audience scope and scale. Urs and Minhaj. (2023) conducted a study related to all these skepticisms. The concept of SPOC was first introduced by Klimova et al. (2023) at the University of California, Berkeley, who argued that SPOC is a small-scale, privatized online "private class." Huang, Li, and Ca (2023) defined SPOC as a niche, private, online course that makes full use of the advantages of high-quality resources in MOOC courses, develops or reorganizes new teaching processes, integrates online video resources, learning activities, and offline self-directed learning in a blended learning mode. Jackson, Michelson, and Munir (2023) believed that SPOC is a restricted online course that not only brings out the advantages in MOOC teaching, but also makes up for the shortcomings and deficiencies in teaching.

SPOCs are learning through the Internet, but the audience is limited to a certain class, mostly used within schools, but it is easier to manage and monitor the information learning of users than MOOCs. In this new situation, MOOC+SPOC is effectively combined to form a new model. This new model is the effective integration of the quality video resources on the MOOC platform and the characteristic resources of SPOC, which solves the tedium of traditional education and focuses on the individual differences of students, thus forming a new activity framework. Its students learn in a blended way online and offline to achieve the management goals of the class.

RELATED MATERIALS AND METHODS

The MOOC+SPOC Model

New models of teaching organization require new competencies for teachers. In traditional teaching, the teacher's response to students in the classroom is based entirely on pre-determined contexts. In the era of big data, previously pre-determined scenarios may no longer exist due to the sudden increase in the volume of data, when processing speeds up and becomes blurred. Teachers, therefore, need to be able to think in terms of big data alongside their own expertise.

Although the MOOC+SPOC model in the context of big data has stronger data storage capabilities, compared with the traditional classroom model, and the single MOOC model or SPOC model, they all follow the basic laws of education. Traditional classrooms are taught primarily in brick-and-mortar classrooms, and teachers' focus primarily on teaching and curriculum. It is difficult to achieve the goal of comprehensive training of students because of its weak teaching relevance, poor feedback, low completion rate of independent learning, and poor learning effect. In contrast, the MOOC+SPOC model is an interactive blend of online and offline activities, with its online model allowing teachers and students to communicate online through videos and discussion forums. Through its offline, physical classroom, face-to-face knowledge exchange, on the other hand, it emphasizes collaboration and enquiry, enabling deep knowledge learning.

The MOOC+SPOC model has the following advantageous features: differentiation, initiative, personalization, and interactivity. These features firstly promote both the external branding effect of universities and their educational information reform and improve teaching quality. At the same time, more emphasis is placed on giving students an in-depth learning experience, which enhances

their motivation to learn, improves the course completion rate, and maximizes the scarce information resources of universities.

The application of Blended Learning in English education may face some potential challenges, so this article provides some suggestions:

1. **Provide device support:** Schools can consider providing students with the necessary technical equipment, such as laptops or tablets, to ensure that every student can participate in blended learning.
2. **Provide online support**: Schools can strive to improve the campus network environment, ensuring that students have smooth access to online resources and course content, both on campus and remote learning.
3. **Provide clear guidance**: Schools and teachers need to provide students with clear blended learning guidance, including how to use online platforms, participate in online discussions, and submit assignments.
4. **Motivate student participation**: Actively motivating students to participate in blended learning activities, such as setting up reward mechanisms or encouraging students to share their online learning achievements and experiences.
5. **Provide professional training and encourage sharing of experiences**: Schools can organize training courses for teachers, teaching them how to effectively design and manage blended learning courses, as well as how to use relevant technical tools. Encourage teachers to share their successful experiences and teaching methods in blended learning, and promote experience exchange and sharing.

Overall, addressing the challenges faced by blended learning models requires joint efforts from schools, teachers, and students.

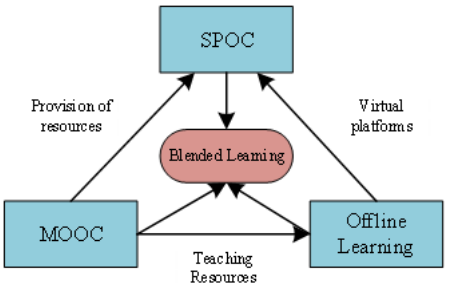
MOOC+SPOC model can make full use of the fragmented time to effectively improve the learning efficiency of learners. The construction of MOOC+SPOC mixed teaching platform in higher vocational institutions can mix online theoretical learning, offline practical operation, independent inquiry, and collaborative learning organically, which creates new teaching platform in school.

The information management platforms of universities based on the MOOC+SPOC model mainly include the online course platform, and the online teaching platform of Harbin Institute of Technology, etc. The advantage is that teachers and students can complete communication, monitor learning progress and learning evaluation, and submit assignments on these platforms. The information management platform of higher vocational institutions can use the convenience of the Internet to check students' learning progress and homework completion in real time, and students can communicate with teachers online in real time, which is more conducive to students' learning progress. An effective learning-material management technology and method is urgently needed to manage them in a scientific and orderly manner, so as to realize the orderly retrieval of MOOC resources in different retrieval platforms, different languages, and different types.

MOOC+SPOC information resource management model service functions include: the combination of online resources and offline learning, including a mixture of different information service models, learning environments, etc. The combination of MOOC+SPOC online resources and offline learning maximizes the use of its functions. Offline learning facilitates face-to-face communication, interaction, and cooperation among users. The MOOC platform can provide a wide range of course information resources, while the SPOC is a virtual platform that facilitates university teachers to tutor and answer questions, monitor and assess, and flip the classroom, providing activities both inside and outside the classroom. The circular structure between the three is shown in Figure 1.

Under the ELT communication pathway, students' learning efficiency is greatly enhanced through online learning before class for pre-study, and in class by consolidating their knowledge. This OBE education concept leaves a lot of time for students to carry out deep knowledge research activities,

Figure 1. MOOC+SPOC Teaching Resource Management Service System



such as discussions, which greatly promotes students' motivation to learn. Students can watch the MOOC video content, adjust their learning progress, and complete online exercises on their own before the class, and can communicate with the teacher online in a timely manner to identify problems and answer questions at the same time. The teacher can keep track of the students' self-learning situation and record it in time. In the physical classroom, through SPOC flipped classroom and other means, students are set relevant inquiry questions to internalize their knowledge and analyze the content recorded before class to optimize offline practice in time. After the class, students should review and consolidate in time, and teachers use WeChat and QQ to test students' learning.

The construction of the MOOC+SPOC English teaching resource management model in the network environment will have to change the traditional concept and achieve innovation in the learning mode, and the learning pathway in this model, as shown in Figure 2.

Compared with MOOC, SPOC is more miniaturized and private universities have used the MOOC platform to carry out SPOC teaching experiments and have launched CNSPOC cloud course platforms one after another, all of which have achieved good teaching results. MOOC and SPOC learners have their own advantages, but there are essential differences in the way they work. Compared with traditional teaching classrooms, the use of big data is more convenient, which greatly improves students' learning efficiency. SPOC and MOOC are shown in Table 1. The size of learners refers to the number of students participating in teaching activities, while the favorite number refers to the number of teaching resources collected by students on MOOC or SPOC platforms. Learning time represents the length of time that students participate in learning on the teaching platform, while course consumption refers to the number of teaching behaviors that students click on, watch, submit assignments, and so on, in the course. Course passing refers to the situation where students complete

Figure 2. English language Teaching and Learning Communication Styles

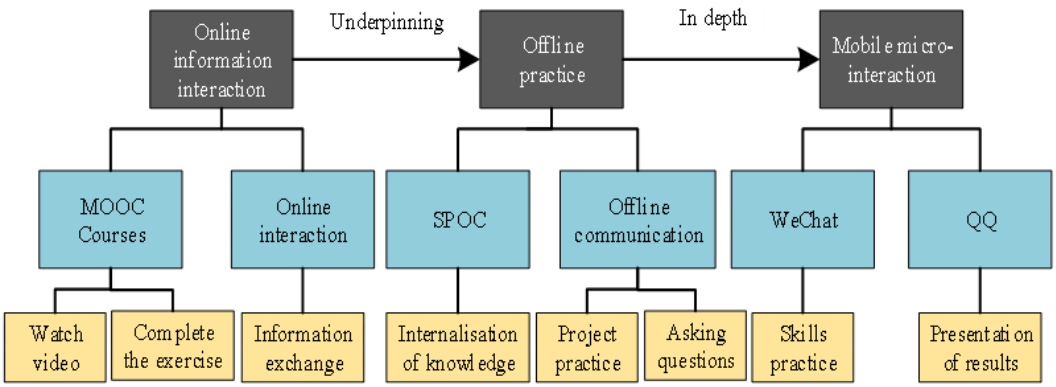


Table 1. Comparison Between MOOC and SPOC

Category	MOOC	SPOC
Learner size	520	380
Number of favorites	550	450
Length of learning	460	440
Number of course attrition	100	120
Number of course passes	420	460
Number of applicability	486	432

all course content as required. Applicability refers to the ability of students to apply the knowledge they have learned to practical situations, while internalization of knowledge means that students transform the knowledge they have learned into their own understanding, thinking, and expression, forming an internal cognitive structure. MOOC and SPOC are two common forms of courses in online education, and face-to-face learning can promote students' creativity and innovation. Therefore, future research should explore the optimal combination of online and offline learning forms, as well as their respective advantages and limitations. The main advantage of SPOC is that teachers return to small classroom teaching, effectively reducing classroom attrition rates, improving course learning pass rates, as well as course teaching quality.

The results of the visual comparison between MOOC and SPOC on six different indicators are shown in Figure 3.

Figure 3 shows two pie charts. The offline classroom teaching means that the teacher determines the classroom content based on the students' online learning, and uses project-based teaching methods, such as classroom Q&A and interactive group discussions to deliver the classroom content so that students internalize and absorb the content and understand it in depth. The MOOC+SPOC online and offline hybrid English teaching activities are shown in Figure 4.

In the combination of Massive Open Online Courses (MOOCs) and Small Private Online Courses (SPOCs), there are important ethical considerations involved, including data validity, reliability, bias, and credibility. For example, in terms of data validity, it is necessary to ensure that the data and information submitted by students are true and accurate to maintain academic integrity. Schools also need to adopt effective data validation measures to prevent students from cheating or tampering with data, avoid biases that discriminate against gender, race, geography, and other factors in curriculum

Figure 3. Visual Comparison of MOOC and SPOC on Six Different Indicators

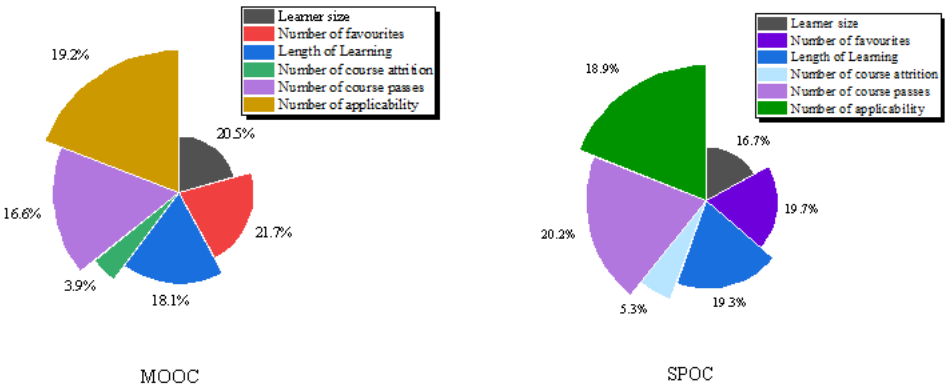
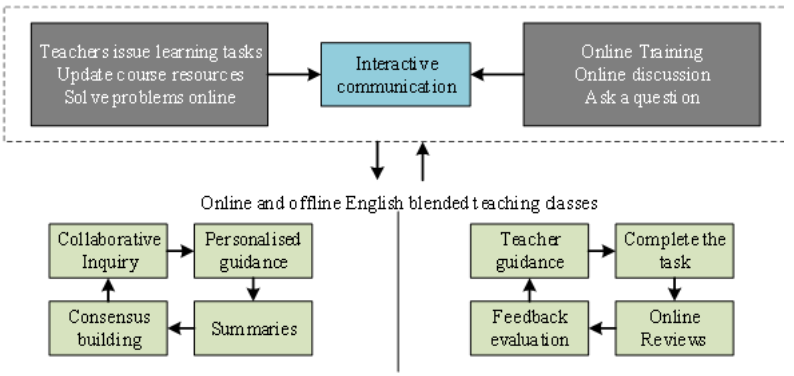


Figure 4. MOOC+SPOC Online and Offline Combined Hybrid English Teaching Activities



design and evaluation, and ensure the fairness of each student. Schools should also provide clear and transparent course information and teaching objectives to enhance the credibility and transparency of the curriculum. When designing and implementing large-scale open online courses+SPOC models, educational institutions and teachers need to carefully consider these ethical standards to ensure the quality and fairness of the curriculum, and promote student learning effectiveness and development.

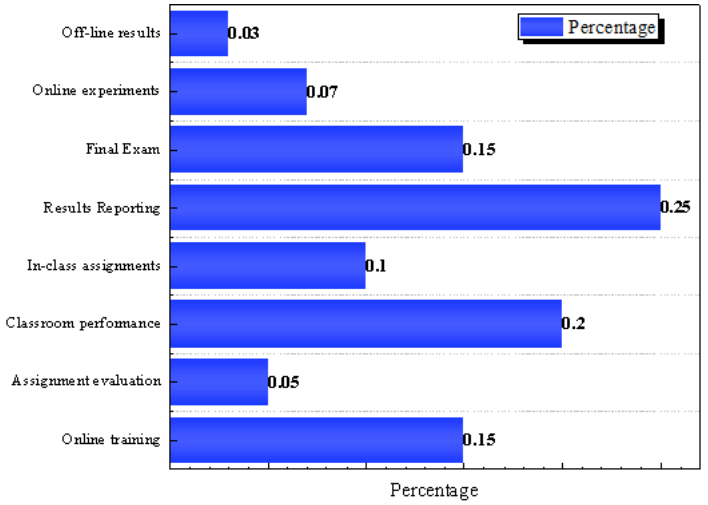
Teaching Evaluation Design

Teaching evaluation refers to teachers' monitoring and assessment of students' learning behaviors and learning effects. As online and offline teaching are integrated, unit assessment and learning feedback are important to consider. Teachers begin with the first formative assessment of students' online learning completion, online discussion performance, and online assignments, thereby we can understand the students' mastery of English teaching knowledge, and then different teaching plans can be formulated according to the differences of each person's mastery, so as to truly achieve differentiated teaching to ensure the maximum effect of educational resources. In the offline classroom, teachers conduct a second formative assessment based on students' class attendance, class performance, in-class assignments, and final exams. The sum of the two formative assessments is the summative assessment. In the MOOC+SPOC online and offline integration environment, the teaching evaluation of this course consists of four components. The proportion of each part of the teaching evaluation is shown in Table 2.

Table 2. Percentage Data of Each Part of Teaching Evaluation

Category	Percentage	Subcategories	Percentage
Platform Learning Assessment	20%	Online training	15%
		Assignment evaluation	5%
Offline Classroom Assessment	30%	Classroom performance	20%
		In-class assignments	10%
Terminal Assessments	40%	Results Reporting	25%
		Final Exam	15%
Lab Assessments	10%	Online experiments	7%
		Off-line results	3%

Figure 5. Visual Comparison of the Percentage Data for Each Component of the Teaching Evaluation



The results of the visual comparison of the percentage data for each component of the teaching evaluation are shown in Figure 5.

Hybrid Teaching Evaluation Indicators

In this study, the Delphi method was used to construct the indicator system, and the specific methods are described in the following text.

The Delphi method is an expert interactive prediction technique commonly used to deal with complex or fuzzy problems by repeatedly investigating and providing feedback from multiple experts to reach a consistent conclusion.

The creation of a triangular fuzzy function and the collation of the resulting data seen in formulas (1) through (10), is detailed in Equations (1) through (10).

$$\underset{\sim}{n} = \left(l_A, m_A, u_A\right) \tag{1}$$

$$\underset{\sim}{N} = \left(L_A, M_A, U_A\right) \tag{2}$$

$$l_A : \min\left(x_{Ai}\right),\ \ i = 1 \sim n \tag{3}$$

$$m_A : \left(x_{A1}, x_{A2}, \ldots\ldots x_{An}\right) 1 / n,\ \ i = 1 \sim n \tag{4}$$

$$u_A : \max(xAi),\ \ i = 1 \sim n \tag{5}$$

$$L_A : \min\left(X_{Ai}\right), i = 1 \sim n \tag{6}$$

$$M_A : \left(X_{A1}, X_{A2}, \ldots X_{An}\right)^{1/n}, i = 1 \sim n \tag{7}$$

$$U_A : \max\left(X_{Ai}\right),\ i = 1 \sim n \tag{8}$$

$$\mu_n\left(x_i\right) = \begin{cases} 0 & 0 < x < l_A \\ \dfrac{x - l_A}{m_A - l_A} & l_A \le x < m_A \\ \dfrac{-x + u_A}{u_A - m_A} & x = m_A \\ x > m_A \end{cases} \tag{9}$$

$$\mu_N\left(x_i\right) = \begin{cases} 0 & 0 < x < L_A \\ \dfrac{x - L_A}{M_A - L_A} & L_A \le x < M_A \\ 1 & x = M_A \\ \dfrac{-x + U_A}{U_A - M_A} & x > M_A \end{cases} \tag{10}$$

RESULTS AND ANALYSIS

Analysis of Experimental Results

This paper takes the freshman class of 2021 of Central South University as the research object to illustrate the practice process of blended English teaching under the MOOC+SPOC environment. Among them, the traditional teaching method takes up a lot of time in introducing English professional noun concepts, and students generally reflect that the content is difficult. In the MOOC+SPOC environment, teachers upload MOOC micro-videos to the platform for students to watch and learn before class. The MOOC+SPOC platform cannot only adjust the learning progress according to students' own English learning mastery, but also teachers can use the time saved in the classroom to solve students' doubts online, and can use a variety of online discussion methods until the students fully understand.

The course materials, syllabus, e-learning materials, and the amount of class time were the same. The final examinations were conducted using a test bank of questions, and the final paper results are shown in Tables 3 and 4.

Table 3. Final Examination Results of the English Class 2021 Course

Score Band	Less Than 60	60-69	70-79	80-89	90-100
Number of people	1	12	26	33	8
Percentages	1.5	15	32.5	41	10

Table 4. Final Exam Results for English Classes in 2020

Score Band	Less Than 60	60-69	70-79	80-89	90-100
Number of people	12	27	19	18	2
Percentages	16	34.5	24	23	2.5

A comparison of the number and percentage of each mark band in the final examinations of the English classes of the Classes of 2020 and 2021 is shown in Figure 6.

As can be seen from Figure 6, the grade excellence rate of the English class of Class 2021 is four times higher than that of the English class of Class 2020, the average grade is 13 points higher than that of Class 2020, and the failure rate is one-tenth of that of the 2020 Class. In terms of the distribution of grades, the English class of Class 2021 had a relatively high concentration of students in the 89 to 80 mark band, while the relatively high concentration of students in Class 2020 was in the 69 to 60 mark band, which is much lower than that of Class 2021. These reflect that the effect of the MOOC+SPOC hybrid English teaching model is significantly improved compared to traditional teaching.

In order to further optimize the level of English education in higher vocational institutions, the next step is to study the impact of MOOC and SPOC on the level of English education in higher vocational institutions separately, working towards the best combination of MOOC and SPOC. Throughout the overall study of 16 weeks, descriptive statistical analysis was conducted on the total performance of MOOC and SPOC learners, and their means and standard deviations were compared longitudinally, as shown in Table 5.

Figure 6. Final Examination Results of English Classes in the Classes Of 2020 and 2021

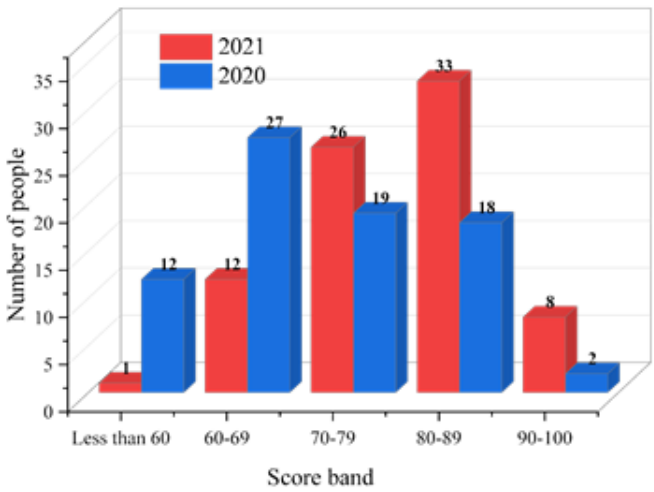


Table 5. Descriptive Statistics of MOOC Learners' and SPOC learners' Total Grades

Category	N	Mean	Standard Deviation	Minimal Values	Maximum Value
SPOC learners	156	83.010	10.230	30.050	68.420
MOOC learners	124	69.645	15.365	33.250	65.160

A visual comparison of the results of the descriptive statistics of the total achievement of MOOC learners and SPOC learners is shown in Figure 7.

As can be seen from Figure 7, the mean of the total scores of SPOC and MOOC learners were 83.010 and 69.645, respectively, with the mean of the total scores of SPOC learners being much higher than that of MOOC learners, exceeding them by about 14 points. The standard deviation of SPOC and MOOC learners was 10.230 and 15.365, respectively, and the standard deviation of the total scores of SPOC learners was lower than that of MOOC learners, indicating that there is less individual variability among SPOC learners.

Next, the content knowledge of MOOC learners and SPOC learners was analyzed to compare the five aspects of memorization, comprehension, application, analysis, and evaluation. In this study, descriptive statistics on MOOC and SPOC learners' content knowledge scores, mean, standard deviation, and minimal and maximal values are presented in Table 6.

Looking at the means of both individually, and for a clearer comparative analysis of the data in Table 6, a comparison of the MOOC learner and SPOC learner content knowledge means is shown in Figure 8.

Looking at the above graph, a longitudinal comparison was made between MOOC and SPOC learners in terms of the mean value dimension. It was found that MOOC learners generally had lower mean values than SPOC learners. In particular, in the assessment objectives, the mean M for SPOC learners was 5.820 and the mean M for MOOC learners was 5.606, with a mean difference of 0.214 points. For the memory and analysis objectives, the mean M of MOOC learners was 7.549 and 4.13,

Figure 7. Descriptive Statistics of the Total Scores of MOOC Learners and SPOC Learners

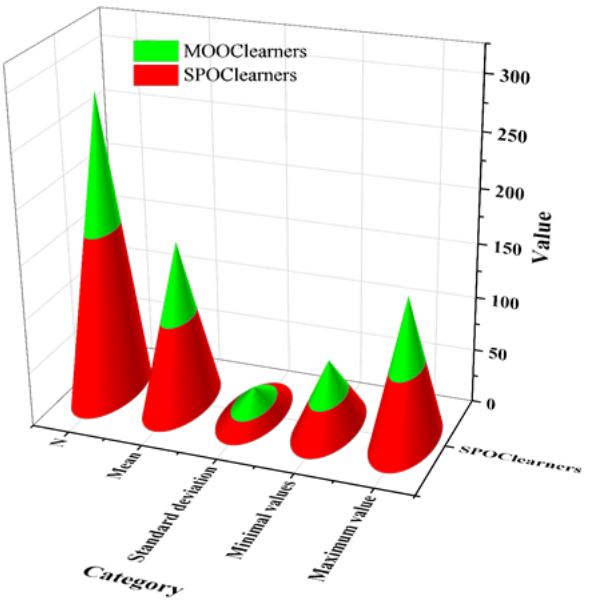
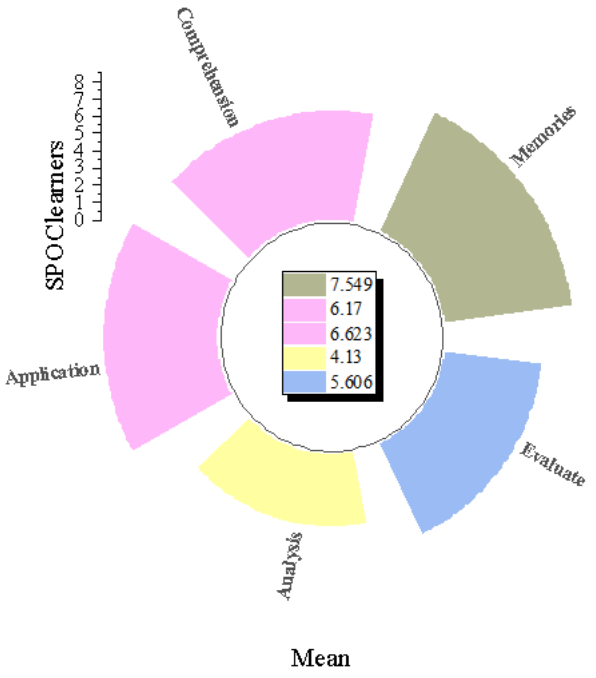


Table 6. Specific Data on MOOC and SPOC Learners' Content Knowledge Scores

Category	Learning Community	Mean	Standard Deviation	Minimal Values	Maximum Value
Memories	SPOC learners	7.612	0.959	4.260	8.800
	MOOC learners	7.549	0.694	6.090	8.800
Comprehension	SPOC learners	6.307	0.763	3.930	7.200
	MOOC learners	6.170	0.776	4.420	7.200
Application	SPOC learners	6.770	0.505	4.010	7.760
	MOOC learners	6.623	0.584	4.800	7.860
Analysis	SPOC learners	4.197	0.385	2.450	7.200
	MOOC learners	4.130	0.380	2.750	7.200
Evaluate	SPOC learners	5.820	0.666	2.800	7.200
	MOOC learners	5.606	0.828	3.010	7.200

Figure 8. Comparison of the Mean Value of Content Knowledge Between MOOC Learners and SPOC Learners



while the mean M of SPOC learners was 7.612 and 4.13. The difference between the mean values of the two groups of learners in the memory and analysis objectives was comparable. Therefore, it can be shown that MOOC learners are less competent than SPOC learners in memory and analysis. At the comprehension and application level, the difference between the two mean values is 0.137 and 0.147, thus indicating that there is still a significant gap in the achievement of this goal.

In order to further understand the reasons for the discrepancy, a comparative analysis of the MOOC and SPOC learners' knowledge of the sub-modules was conducted, in an attempt to analyze the means and standard deviations from a longitudinal perspective and to compare whether there

Table 7. Results of Descriptive Statistics of Unit Knowledge of MOOC Learners and SPOC Learners

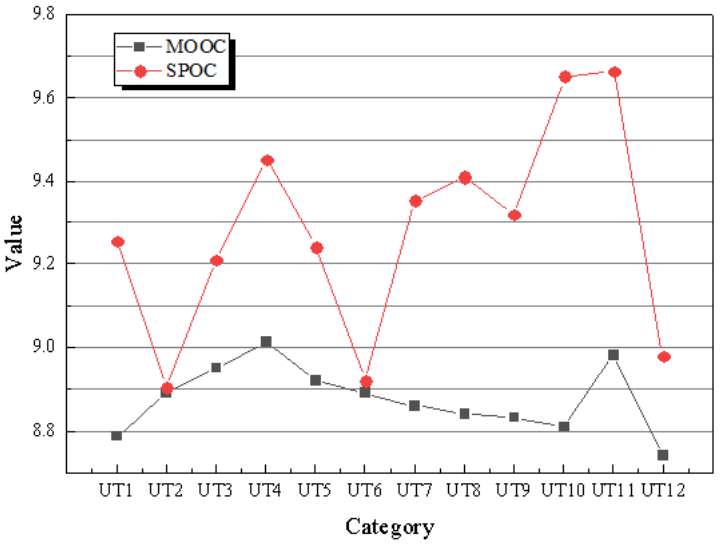
Category	MOOC	SPOC
UT1	8.787	9.256
UT2	8.890	8.904
UT3	8.950	9.210
UT4	9.012	9.451
UT5	8.921	9.241
UT6	8.890	8.919
UT7	8.860	9.352
UT8	8.840	9.410
UT9	8.830	9.320
UT10	8.810	9.650
UT11	8.982	9.662
UT12	8.739	8.978

was any discrepancy in the learning of the modules by different groups. The authors first conducted descriptive statistics on the module knowledge performance of different learners in the 12 modules, and the data are shown in Table 7.

The results of the descriptive statistics of MOOC learners' and SPOC learners' unit knowledge are shown in Figure 9.

A comparison of the mean values showed that there were commonalities and differences between the two. For both MOOC and SPOC learners, the best mastery was in Unit 11, with mean M = 8.982 and 9.662, respectively, and for Unit 2 and Unit 6, as a whole, with mean M = 8.890 and 8.829, respectively. SPOC learners were at the lowest point in Unit 2, with a mean M = 8.890.

Figure 9. Results of Descriptive Statistics of Unit Knowledge for MOOC Learners and SPOC Learners



In the actual implementation process of the blended teaching model, in order to maximize the effect of online and offline teaching, it is necessary to make adequate preparations before class. Teachers should systematically sort out different knowledge, the relationship between the points, and upload the learning materials to the online platform before class to provide students with sufficient learning materials. By organically combining the two and applying them to English teaching, the level of English education can be effectively improved, thus promoting the personalized development of students in higher vocational institutions, and paving the way for the improvement of students' English proficiency. In the actual implementation process of the blended English teaching mode, in order to maximize the effectiveness of online and offline teaching, the content knowledge of MOOC and SPOC learners was analyzed. In this study, a descriptive statistical analysis was conducted on the content knowledge scores, mean, standard deviation, minimum, and maximum values of MOOC and SPOC learners, and comparisons were made from five aspects: memory, understanding, application, analysis, and evaluation. According to the statistical results, the average total score of SPOC students was much higher than that of MOOC students, surpassing them by about 14 points. In the evaluation objectives, the average score of SPOC learners was higher than that of MOOC learners. At the same time, there was a significant gap in understanding and application between the two groups of learners, and further research and exploration are needed to optimize the blended English teaching model. Therefore, it can be concluded that the blended English teaching model has good teaching effectiveness, but further improvements are still needed.

Based on the research conducted, it was found that a MOOC+SPOC blended learning model could effectively improve the level of vocational English education. Specifically, the organic combination of MOOC and SPOC can compensate for their respective shortcomings, leading to the enhancement of students' interest, autonomy, and learning effectiveness. Furthermore, significant differences in terms of means and standard deviations were observed between MOOC and SPOC learners by analyzing the descriptive statistics of knowledge scores in different units, indicating that the blended learning model that combines online and offline instruction has different advantages across different levels of learning. Therefore, the organic fusion of MOOC and SPOC should be fully utilized, and diverse learning resources and strategies should be provided while preparing adequately before class to establish a personalized English learning environment that can better promote the personalized development and English proficiency of vocational college students.

In conclusion, the valuable insights obtained from this research can help in improving and optimizing vocational English education. The future works for improving and optimizing vocational English education in the context of big data include further exploring the application of MOOC and SPOC in English teaching, striving to achieve the best combination of MOOC and SPOC, and promoting the personalized development of vocational college students' English proficiency. In addition, teachers should systematically organize the relationship between different knowledge points and upload sufficient learning materials to the network platform before class to provide students with ample learning resources. The combination of these two can effectively improve the level of English education and pave the way for the improvement of students' English proficiency.

Analysis of Practical Applications

This article explores the correlation between large-scale, open, online courses+SPOC and big data, and studies the teaching effectiveness and feasibility of blended learning models.

RESEARCH FINDINGS AND LIMITATIONS

This research study mainly focuses on the reform of vocational English language education in the context of big data, without considering educational reforms in other disciplinary fields. In terms of research, it is possible to expand the scope of research, explore educational reforms in more disciplinary fields, and conduct in-depth comparative studies. At the same time, further exploration and analysis

can be conducted on the correlation between large-scale, open, online courses+SPOC and big data, as well as the impact and role of this correlation on educational reform.

This research adopted a blended learning model, but did not explore the advantages, disadvantages, and applicability of other teaching models. The teaching needs and applicability of different disciplines and student groups may vary, requiring more in-depth research. In teaching practice, different teaching models can be adopted for experimental research based on the needs of different disciplines and student groups, in order to understand the advantages, disadvantages, and applicability of different teaching modes. At the same time, various teaching methods can be flexibly applied based on specific situations to improve teaching effectiveness and student learning motivation.

This study explores the correlation between large-scale, open, online courses+SPOC and big data, but does not elaborate on the specific role and impact of this correlation, which requires further exploration and research.

This research takes China as an example, while the current situation and needs of vocational English language education in other countries may vary, requiring targeted research. In international comparison, it is possible to strengthen exchanges and cooperation with other countries, draw on the experience and lessons of education reform in other countries, and provide reference for domestic education reform.

In short, through continuous exploration, research, and teaching practice, continuous improvement and innovation, the quality and effectiveness of vocational English language education can continuously improve, laying a solid foundation for cultivating more high-quality talents with foreign language skills.

The practical applications of this article include the following aspects:

1. **Guiding the reform of English education in vocational colleges:** The approach proposed in this article to improve English education in vocational colleges under the background of big data can provide useful reference for vocational colleges and guide their practice of English education reform. By optimizing teacher development, curriculum design, teaching modes, and other aspects, vocational colleges can improve the quality of English education and cultivate more English talents that meet social needs.
2. **Promoting the application of a blended learning model in vocational English education** This article discusses the correlation between large-scale, open, online courses+SPOC and big data, as well as the teaching effectiveness and feasibility of blended learning model. Vocational colleges can combine the ideas and methods proposed in this article to promote the application of a blended learning model in English education, improve teaching effectiveness, and enriching teaching methods.
3. **Promoting the innovative application of educational technology and big data in vocational English education:** This article explores the application of big data technology in vocational English education, providing new ideas for the combination of educational technology and big data. Vocational colleges can actively explore and apply educational technology and big data technology, develop corresponding teaching resources and tools, and improve teaching effectiveness and teaching management.
4. **Promoting experience exchange and cooperation among vocational colleges**: The improvement methods and measures proposed in this article can provide reference and inspiration for other vocational colleges. Vocational colleges can strengthen experience exchange and cooperation among themselves, jointly explore the path and methods of English education reform, and jointly promote the development of vocational English education.

In the future, the following development directions can be considered:

1. **Deepening the application of big data in vocational English education:** In the future, the application of big data technology in vocational English education can be further deepened,

including but not limited to personalized learning recommendation systems, learning behavior analysis and prediction, and teaching effectiveness evaluation. By fully utilizing big data technology, we can achieve more refined and intelligent English education management and teaching services.

2. **Promoting the integration of educational technology and artificial intelligence in vocational English education**: In the future, the integration of educational technology and artificial intelligence can be explored, and more intelligent teaching practices in vocational English education can be carried out. For example, combining natural language processing technology to develop intelligent English writing assistance tools; Design personalized oral training systems using speech recognition technology, etc.
3. **Strengthening international cooperation and exchange**: In the future, cooperation and exchange with advanced international educational institutions can be strengthened. Researchers can jointly explore the experience and methods of English education reform, and promote the internationalization level and influence of vocational English education through international cooperation projects, joint research, and other means.
4. **Continuously monitor the development trends of new technologies**: In the future, the development trends of emerging technologies, such as virtual reality, augmented reality, blockchain, etc., should be closely monitored and the potential application of these new technologies in vocational English language education should be explored. Researchers should timely adjust educational and teaching strategies, adapt to the new needs of educational technology development, and promote continuous innovation and development of vocational English language education.

CONCLUSION

Against the backdrop of the new teaching organization model requiring teachers to possess new abilities, teachers are no longer just transmitters of knowledge, but also need to play the role of resource integrators, transforming massive amounts of information and data into effective teaching resources, and promoting personalized learning and development of students. At the same time, the demand for high-quality talents with foreign language skills is increasing in modern society. However, the current English proficiency of Chinese university graduates often fails to meet the practical needs of society, which has also made the reform of college English language teaching a hot topic. This article explores ways to improve vocational English language education in the context of big data from multiple aspects, such as teacher construction, curriculum design, teaching mode, teaching resources, and learning evaluation. It also delves into and analyses new models and means of vocational English language teaching that are conducive to big data analysis. This article explores the teaching effectiveness and feasibility of a blended learning model that combines large-scale, open, online courses, and SPOC to reform traditional English language teaching methods and plans. Research has shown that this method can optimize current teaching strategies and activities, better meeting the personalized learning needs of students. The results of this study will help guide the development direction of future vocational English education, enhance students' English learning effectiveness and practical application ability, and lay a solid foundation for their career development. This study can provide useful references for innovation and progress in the field of education, and promote the development of vocational English language teaching towards a more scientific, effective, and personalized direction.

DATA AVAILABILITY

The figures and tables used to support the findings of this study are included in the article.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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CORRESPONDING AUTHOR

Correspondence should be addressed to Yuan Teng, tengyuanhbqc@163.com

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Teng Yuan was born in Henan, China, in 1987. She studied in Xianyang Normal University and received his bachelor's degree in 2011. From 2011.09 to 2012.08, she worked in Hebi Foreign Language High School. From 2012.09 to now, she works in Hebi Automotive Engineering Professional College. She has published a total of 4 papers. Her research interests are included English education.