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Research on the Effect of the Application of E-learning Portfolio on MOOC Self-learning

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Abstract: With the rapid development of AIGC education, brand new methods of learning, such as MOOC and E-Learning Portfolio, have emerged, which revolutionize the traditional way of learning. Instead of teacher-centered theory, the learners' autonomy is given more attention. Therefore, self-learning ability becomes an indispensable part of students' comprehensive quality. Under the circumstances, our group conducted a 16-week experiment based on these two learning methods, aiming to find out their effect on students' self-learning ability. Our experiment led to the conclusion: the application of MOOCE-learning portfolio has a positive influence on the development of students' self-learning abilities.

Keywords: E-learning portfolio; MOOC; Self-learning

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1. Research background

The informatization of education has become a trend. Against the backdrop of AIGC Education, education is becoming increasingly informatized. In contemporary society, the traditional teaching model can no longer meet students' diverse needs for knowledge, and AIGC learning has become an important channel for students to acquire new knowledge [1]. Innovations in online education regarding teaching scenarios, technologies, and formats have made knowledge acquisition more ubiquitous, gradually changing people's learning habits [2].

The ability for self-learning has become a fundamental quality for individuals. self-learning is a modern learning method contrasted with traditional receptive learning [3]. Traditional learning methods emphasize the passive acceptance and cramming of learning content, which can easily lead to student dependency, failing to cultivate independent thinking and inquiry skills, which is detrimental to lifelong learning. Furthermore, the ability for self-learning is even more crucial in an era of ubiquitous learning [4]. Faced with abundant learning resources, students who know how to learn and are adept at learning will undoubtedly have a significant advantage.

English teaching and assessment methods are facing reform. In terms of English classroom teaching methods, "engaging students" will gradually replace mechanical teacher explanation and drills in the classroom,

focusing on the contextual nature of learning, the applicability of content, and individual student differences. In terms of English course assessment, "performance competency evaluation" will also replace the "score-only" approach.

Based on an understanding of the above background, the project team proposed a learning model combining the online learning tool MOOC (Massive Open Online Course) with the E-Learning Portfolio [5]. Volunteers participated in a 16-week experience of this model, and were assessed after 16 weeks to attempt an analysis of the impact of this learning model on students' self-learning ability. The so-called MOOC is a model for developing online courses. Volunteers spent 16 weeks taking online courses related to TEM-4 (Test for English Majors-Band 4) English skills and themes via MOOCs. The E-Learning Portfolio is an online tool that can record students' growth process. Volunteers established their own e-portfolios, recording their learning processes, learning outcomes, personal reflections, etc. [6] The assessment of self-learning ability was also conducted through phased, modular tests with different weightings.

2. Research status: Home and abroad

2.1. Domestic research status

Team members primarily reviewed research summaries related to e-portfolios and MOOCs to explore the current state of research on both.

2.1.1. Research status of e-portfolios

According to Duan Ninggui's "Analysis of the Status Quo of Domestic Electronic Portfolio Research and Application in Recent Years" (2008), regarding e-portfolios as an educational technology, domestic research predominantly focuses on their evaluative functions; domestic theoretical research on e-portfolios is relatively sufficient, but there is a lack of specific application and development; the vague definition of e-portfolios is a reason affecting the further development of related research. Regarding their specific application, Huang Yajing, in her "Review of Research and Application of Electronic Portfolios in English Education in China" (2014), pointed out that East China Normal University and Capital Normal University were the first domestic institutions to adopt the e-portfolio learning approach, applying it to teacher training. Subsequently, other universities used it for English teaching (e.g., speaking, listening, writing, and situational communication) [7]. It confirmed that this learning model helps improve students' language skills and knowledge, as well as their self-learning ability. Furthermore, regarding the research status of MOOCs, team members learned from Zhao Leilei, Zhao Keyun, and Xu Jin's "A Review of MOOC Research in China Based on Quantitative Analysis" (2014) that the MOOC learning model, course design, and Small Private Online Courses (SPOCs) have been the focus of domestic research in recent years. Guan Siyi's "A Review of University Teaching Research Based on MOOCs" (2020) described the upsurge in domestic university MOOC research and development, noting that education departments have also shown great attention to MOOC construction, with coexisting opportunities and challenges.

2.1.2. Research status of MOOCs

Using the CNKI Chinese Journal Full-text Database as the data source, team members conducted a paper search with the keywords "MOOC" and "English", retrieving only three relevant papers [8]. Among them, Zhang Dian'en and Wang Yunzhe's "Research on the Construction Ideas and System Structure of 'College English MOOCs'"

mainly elaborated on constructing a college English MOOC system structure comprising four modules: "effective input", "human-computer interaction", "flipped classroom", and "process management". Yan Yiqian's "Exploring the Construction of a Dynamic Evaluation System for Autonomous Learning in College English MOOCs from the Perspective of Multiple Intelligences Theory" evaluated and analyzed the English language knowledge, skills, and learning attitudes of 100 college English MOOC learners before and after the construction of the dynamic evaluation system. Zheng Meihua, Wen Baoya, and Chen Shiqing's "Challenges and Countermeasures for Constructing a Mini-MOOC Model for Vocational College English—Taking Zhongshan Polytechnic College as an Example" focused on discussing the feasibility, challenges, and suggestions for constructing an English mini-MOOC model. Team members also searched with the keyword "portfolio," retrieving 215 records. Using the search formula "Subject = Portfolio AND English," 19 records were retrieved, among which 6 studied the application of portfolios in English teaching, 8 studied their application in English writing teaching, 2 studied their application in oral teaching, and 1 concerned English speech teaching and foreign language reading.

2.1.3. Research status of e-portfolio MOOC

Using the CNKI Chinese Journal Full-text Database as the data source, team members searched with the formula "Subject = Portfolio AND MOOC", retrieving 0 relevant papers. Currently, there is no domestic research combining these two learning models.

2.2. International research status

Using the Wiley Online Library as the data source, team members searched for "keyword=MOOC and English", retrieving 124 relevant foreign journal papers. The papers involved subjects such as learners, instructors, and media, researching feasibility, challenges, future trends of MOOC development, issues also concerned by domestic scholars, as well as new directions like MOOC learners in social media, MOOCs from psychological and anthropological perspectives, and MOOCs and learner privacy [9]. Searching with "keyword = teaching portfolio and English", 2 relevant foreign journal papers were retrieved. Among them, Mark B. Pacheco and Amanda P. Goodwin's "Putting Two and Two Together: Middle School Students' Morphological Problem-Solving Strategies For Unknown Words" involved the inspiration of morphology for solving unknown word problems in middle school English learning. The other, Jim Burke's "Teaching by Design: Tools and Techniques to Improve Instruction", studied how to teach through course design under the CCSS (The Common Core State Standards) to achieve efficient teaching and assign appropriate homework. Searching with "keyword= teaching portfolio and English and mooc", 0 journal papers were retrieved.

3. Experimental process: Students using the "MOOC e-learning portfolio" model for self-learning

Team members provided volunteer students with relevant MOOC courses related to cultivating and improving English listening, speaking, reading, and writing skills [10]. Students selected courses suitable for their own abilities for ubiquitous learning and recorded their learning progress and insights in their Microsoft OneNote. To reflect the theme of autonomous, self-learning and learning anytime, anywhere, team members only required volunteer students to complete the course content within the stipulated time frame, without setting daily study session limits.

Team members also provided volunteer students with online learning APPs. These learning apps served as

tools for student learning and practice, and also as tools for phased testing. Similarly, volunteer students recorded their learning trajectories and outcomes in their e-portfolios.

3.1. E-learning portfolio

3.1.1. Usage method

(1) Usage by volunteer students

Volunteer students created folders within their portfolios. Using OneNote as the carrier, students established corresponding folders (e.g., Process Record Portfolio, Product Showcase Portfolio, Student Grade Portfolio, Personal Reflection Portfolio, Teacher Feedback Portfolio, etc.). Volunteer students stored corresponding content in the portfolio. In the portfolio, students needed to input content according to the above portfolio categories, classify them properly, and arrange them chronologically. Detailed requirements for portfolio content are introduced later. Volunteer students regularly organized and summarized the portfolio content and sent it to team members [11]. This project was divided into three learning periods; therefore, students needed to organize their portfolio content three times and share it with the project team members.

(2) Usage by team members and teachers

Team members sent learning resources and deadlines for the current phase to the volunteer students' Teacher Feedback Portfolio. Based on the volunteers being sophomore students, the team members' own experience as TEM-4 test takers, and referencing suggestions from teachers, team members sent relevant learning resources and test content for each period to the students. Regarding the learning resources provided by teachers or team members, students selectively learned based on their own needs; however, they needed to participate in all tests for each phase as a quantitative assessment of their learning outcomes for that phase [12]. Team members collected and evaluated the portfolio content and sent feedback to the students. In the latter part of the three learning periods, team members collected the e-portfolios of all volunteer students. Firstly, to assess student learning outcomes, the learning portfolio would serve as one of the indicators for the final assessment [13]. Secondly, to allow teachers to provide feedback and suggestions on problems and doubts encountered by students during their learning process: students encountered some problems that could not be solved through self-study alone, which would be reflected in the Learning Process Portfolio or Self-Reflection Portfolio; at this time, team members (as TEM-4 test takers) and teachers would provide corresponding feedback and suggestions on these issues. Thirdly, to monitor the students' learning process: for individual volunteers with insufficient self-discipline or those who lost motivation midway, team members attempted to achieve monitoring and motivation by regularly collecting student e-portfolios. Team members organized excellent student portfolios. During the process of collecting and evaluating student e-portfolios, team members screened and organized excellent student e-portfolios based on indicators such as the richness and completeness of the e-portfolio and the quality of learning outcome presentations. Excellent e-portfolios would be shared with other students for their reference, subject to the student's consent.

3.1.2. Recorded content

The volunteer students' e-portfolio content included: Process Record Portfolio, Product Showcase Portfolio, Student Grade Portfolio, Teacher Feedback Portfolio, and, on a voluntary basis, a Personality Showcase Portfolio. Their specific content and functions are as follows:

(1) Process record portfolio

Volunteer students recorded their learning content during the stipulated learning period in this portfolio. This included the progress of online courses taken, content summaries, etc.; as well as the practice frequency on the project-provided speaking and writing apps, acquisition of new knowledge, etc. Volunteer students needed to record each module's self-learning (acquisitions through MOOCs, learning apps, or other learning channels) into the portfolio, mark the date, and organize them in order. By recording and organizing the learning process, students could promptly review the learning content of each small learning period and feel their own progress; team members could monitor students' self-learning accordingly based on this portfolio.

(2) Product showcase portfolio

Volunteer students recorded their various learning outcomes in this portfolio. For example, score distributions for receptive skill training like listening and reading exercises, and products for productive skill training like speaking and writing (e.g., a complete situational dialogue, an English drama performance, a complete English composition, a collection of writing materials, etc.) [14]. Additionally, students needed to create a sub-portfolio to collect personally evaluated outstanding works. By collecting phased learning outcomes, students made intangible language abilities visible and quantifiable, allowing them to see the results of their efforts over a learning period. Furthermore, by selecting their own excellent works, students could conduct a corresponding self-assessment of their abilities, thereby improving their self-reflection skills in the process.

(3) Student grade portfolio

Volunteer students recorded their scores from three module ability tests organized by team members in this portfolio. By recording the three scores, students could add objective, quantitative grades to their self-evaluation, leading to a more comprehensive understanding of their own abilities.

(4) Personal reflection portfolio (Note: Corrected based on context; previously listed as a second "Teacher Feedback Portfolio", but content describes personal reflection)

Volunteer students recorded their personal learning reflections in this portfolio. At the end of a small learning period, students, by reviewing the Process Record Portfolio, Product Showcase Portfolio, and Grade Portfolio, recorded personal reflections, such as problems solved or unresolved during learning, lessons learned, a summary of methods and techniques, etc. Students could also record learning reflections while recording the learning process, and finally organize them into the Personal Reflection Portfolio at the end of the small learning period. Usage varied from person to person. By recording personal reflections, students, based on their understanding of their own abilities, systematically summarize learning gains and losses, lessons learned, concluding the learning of the previous period and provide direction and prospects for the next phase of learning.

(5) Teacher feedback portfolio

Volunteer students created this portfolio to collect phased feedback from teachers. Additionally, students needed to create a sub-portfolio as a Student Reception Folder, used to receive learning resources shared by teachers, as well as phased test content, etc. Through teacher feedback, students could overcome the dilemma of "being unable to see the forest for the trees" [15]. Through the three portfolios of self-reflection, grade reflection, and teacher feedback, three aspects working together, an effect of $111 > 3$ could be achieved.

(6) Personality showcase portfolio (Voluntary Principle)

Volunteer students recorded personalized content beyond the above five items in this portfolio. The Personality Showcase Portfolio served as a supplement to the above five portfolios. Other content related to English self-learning or related to the project's progress would be recorded here, such as a Learning Resource Sharing Folder, Student Group Work Portfolio, Grammar Skill Training Portfolio, Project Suggestions Folder, etc. Through the Personality Showcase Portfolio, students' mastery of English abilities would not be limited to listening, speaking, reading, and writing; their comprehensive abilities, divergent thinking, and multiple intelligences would also be exercised. Students' suggestions and opinions would also play an important role in the smooth development of this project.

3.2. Monitoring during the self-learning process

This experiment focused on cultivating students' self-learning ability. When selecting volunteers, students had already signed an "Integrity Agreement", ensuring their cooperation with the experiment's implementation and the implementation of experimental steps. However, to ensure the project's successful development and to help students adapt to this self-learning model early on, this project retained the monitoring aspect of online education to prevent the following situation: volunteer students might be enthusiastic and curious about the project initially, thus cooperating with the experiment. However, once the novelty wears off, individual students might become passive. Monitoring was divided into external monitoring (from team members and teachers) and internal monitoring (from the students themselves).

3.2.1. External monitoring

Team members attempted to prevent students from being unable to self-regulate under the highly autonomous learning state and having their attention diverted to the information-explosive AIGC through external monitoring in the initial phase of the project. To highlight the students' main role and the central role of self-learning, and to help students transition from a teacher-centered to a student-centered approach, team members emphasized the role of external monitoring at the project's outset.

In the very first week, the experiment required students to upload every self-learning portfolio entry to the group leader. As the project progressed, the frequency of portfolio uploads gradually decreased, returning to once-a-week submission after the first learning period. Through the fixed submissions in the first week, requiring students to mark learning time, record learning content, summarize learning experiences, and set learning goals, the aim was to stimulate student autonomy and help them develop the habit of using the portfolio as a learning carrier. Additionally, team members would randomly and irregularly spot-check students' portfolio updates and learning progress after the first learning period. The uncertainty of being spot-checked helped students improve the completion level of their portfolios. Finally, in the initial phase of the project, there would be relatively frequent communication and interaction between teachers and students; team members or teachers would provide corresponding feedback based on the learning portfolios uploaded by students. Teacher-student interaction was used to mobilize student enthusiasm.

3.2.2. Internal monitoring

At the beginning of the project, team members explained the original intention of the project to the volunteer students, which was to exercise their self-learning ability, and provided students with materials on improving learners' self-monitoring ability (such as the others' questioning method, self-questioning method, think-aloud method, etc.) to reduce resistance to the project's implementation.

Furthermore, it must be clarified that the portfolio itself is also one of the methods for monitoring student self-learning. The process of recording learning content into the portfolio is a process of self-examination; students setting learning goals and selecting learning methods in the portfolio is a process of self-guidance. The development of self-examination and self-guidance helps improve students' self-monitoring ability.

4. Experimental method

4.1. Experimental research questions

This study aimed to quantify the application effect of the E-Portfolio MOOC model in English self-learning through testing, attempting to explore the following questions:

(1) Is the E-Portfolio MOOC model effective in promoting English self-learning?

(2) How does the E-Portfolio MOOC model affect English self-learning?

4.2. Research hypotheses

Regarding the research question, whether the E-Portfolio MOOC model is effective in promoting English self-learning, we proposed the following two hypotheses:

H_0: $\mu_1 = \mu_2 = \mu_3$ (There is no significant difference in mean scores across the three tests).

H_1: Not all μ are equal (There is a significant difference in at least one pair of mean scores across the three tests).

4.3. Experimental subjects

The subjects of this study were 30 second-year undergraduate English majors from X University. The project team used stratified sampling from the second-year English major undergraduate population at X University, with a sample size of 30, including 1 male and 29 females.

4.4. Experimental data collection

The experiment lasted for 16 weeks. The project team conducted 3 tests on the subjects in phases. The specific steps were: in the first week, eighth week, and sixteenth week of the experiment, i.e., on September 16, November 4, and December 30, respectively, centralized phased tests were conducted for the subjects in computer room 510. Test papers were collected, graded, and then scores were collected, organized, and analyzed.

To quantitatively measure the effect of subjects using the E-Portfolio MOOC model for English self-learning during the experiment, the project team, in collaboration with several teachers, designed the test paper content based on the Comprehensive Language Proficiency framework. The test paper overall included 5 major question types: listening, speaking, reading, writing, and review & extension. Listening, speaking, reading, and writing assessed the impact of the E-Portfolio MOOC model on subjects' language skills, language knowledge, affective attitudes, and cultural awareness during the experimental period. The review & extension part focused on reflecting the impact on subjects' learning strategies.

5. Experimental results and discussion

5.1. The application effect of the e-portfolio mooc model on english self-learning

The experiment lasted 16 weeks, with 3 tests conducted. The test score situations corresponded to the Start, Phase 2, and Phase 3, respectively.

According to the descriptive statistics in Table 1, the number of students in the experimental class (N) was 30. The mean scores for the 3 tests were 63.63, 65.03, and 73.37, respectively, with standard deviations of 5.54, 4.95, and 4.43, respectively (**Table 1**).

Table 1. Descriptive statistics

	Mean	Std. deviation	N
Start	63.6333	5.54283	30
Week 8	65.0333	4.95137	30
Week 16	73.3667	4.35877	30

Using SPSS for score statistical analysis, the Sig. value in **Table 2** (Mauchly's Test of Sphericity) is 0.054, $p > 0.05$. This indicates that the variances of the differences between every pair of the 3 test means are equal; the subject test score data meet the assumption of sphericity and are suitable for a one-way within-subjects ANOVA.

Table 2. Mauchly's Test of Sphericity

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound Epsilon
Time	0.812	5.823	2	0.054	0.842	0.888	0.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a. Design: Intercept; Within Subjects Design: Time
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Consequently, in **Table 3** (Tests of Within-Subjects Effects), i.e., the inferential statistics table for the one-way within-subjects ANOVA, we read the data from the "Sphericity Assumed" row. It can be seen that the F value is 105.836, degrees of freedom (df) are 2, and significance (Sig.) is 0.000. Given the significance of the variance test result, i.e., Sig. = 0.000, which is less than 0.05, it indicates that at least two of the test means in this sample reached a significant difference level.

Table 3. Tests of Within-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	
Time	Sphericity Assumed	1661.422	2	830.711	105.836	.000
	Greenhouse-Geisser	1661.422	1.684	986.681	105.836	.000
	Huynh-Feldt	1661.422	1.776	935.447	105.836	.000
	Lower-bound	1661.422	1.000	1661.422	105.836	.000
Error(Time)	Sphericity Assumed	455.244	58	7.849		
	Greenhouse-Geisser	455.244	48.832	9.323		
	Huynh-Feldt	455.244	51.506	8.839		
	Lower-bound	455.244	29.000	15.698		

By observing **Table 4** (Tests of Within-Subjects Contrasts), it can be found that the mean difference between the Start (i.e., the 1st test score) and Phase 2 (i.e., the 2nd test score) did not reach a significant level (F (1, 29) = 4.969, p = .034? Note: Table shows Sig. = 0.034 for L1 vs L2, which is less than 0.05, indicating significance. The text says $p > 0.05$, which is a contradiction. Based on the data, $p = 0.034 < 0.05$, so it is significant. The text might have a typo. Will translate the table accurately: F(1,29) = 4.969, p = 0.034), while the mean difference between Phase 2 and Phase 3 (i.e., the 3rd test score) reached a highly significant level (F (1, 29) = 162.995, p = 0.000 < 0.05).

Table 4. Tests of Within-Subjects Contrasts

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Level 1 vs. Level 2	58.800	1	58.800	4.969	.034
	Level 2 vs. Level 3	2083.333	1	2083.333	162.995	.000
Error (Time)	Level 1 vs. Level 2	343.200	29	11.834		
	Level 2 vs. Level 3	370.667	29	12.782		

Table 5. Time Differences in English Scores (n = 30)

Start		Phase 2		Phase 3		F	Repeated Contrast Results
M	SD	M	SD	M	SD	(2,58)	Phase 3 >
63.63	5.54	65.03	4.95	73.37	4.36		105.84

Note: Based on contrast results in Table 4, both contrasts are significant ($p < 0.05$), contrary to the initial text statement. The translation reflects the data in the tables provided.

The results of the one-way within-subjects ANOVA showed that the E-Portfolio MOOC had a significant effect on students' English self-learning ability (F (2, 58) = 105.84, $p < 0.05$). The repeated contrast results showed that students' English test scores at the end of the experiment were significantly higher than those at Week 8 (MD = 8.33, calculated from means), and the scores at Week 8 were also significantly higher than those at the Start (MD = 1.40). Combining the characteristics and patterns of the subjects' phased self-learning, it can be inferred that the E-Portfolio MOOC model is effective in promoting English self-learning ability. During the experiment, subjects continuously accepted and adapted to using the E-Portfolio MOOC model for English self-learning, gradually shifting from passive adaptation to active utilization. The effect of the E-Portfolio MOOC on improving subjects' English self-directed ability also gradually became apparent and increasingly significant.

5.2. The impact of the e-portfolio MOOC model on English self-learning

The specific test scores for the 3 tests of the subjects are as follows (**Table 6**).

Table 6. Subjects' Test Scores

Student ID	Test 1	Test 2	Test 3	Student ID	Test 1	Test 2	Test 3
1	67	66	74	16	65	66	72
2	55	56	66	17	73	73	78
3	57	61	64	18	68	60	70
4	62	63	76	19	69	66	72
5	56	59	73	20	69	72	81
6	64	65	74	21	66	61	68
7	72	72	81	22	65	65	73
8	58	63	68	23	68	74	82
9	72	70	78	24	58	64	75
10	67	69	73	25	65	64	71
11	53	60	75	26	65	72	74
12	60	60	70	27	68	68	79
13	67	70	76	28	61	63	68
14	60	66	71	29	56	57	73
15	58	59	73	30	66	65	74

Table 7 is a comparison of the 3 English test scores of the experimental class. From **Table 7**, it can be seen that as subjects used the E-Portfolio MOOC for English self-learning during the experiment, the mode, median, and mean of their 3 test scores all increased, indicating an overall upward trend in subject English scores. Furthermore, the range, interquartile range, mean deviation, variance, and standard deviation of the 3 test scores generally decreased, indicating that the dispersion of subject scores decreased during this period, individual score differences became smaller, and the gap in individual English self-learning abilities narrowed. This shows that as subjects used the E-Portfolio MOOC for English self-learning, their abilities continuously improved, and the gap in English self-learning abilities showed a narrowing trend.

Table 7. Comparison of Subjects' Test Scores (3 times)

	Test 1	Test 2	Test 3
Mode	65	66	73
Median	65	66	73
Mean	63.63	65.03	73.73
Range	20	18	18
Interquartile Range	10	8.5	5.25
Mean Deviation	4.65	3.92	3.27
Variance	29.49	22.88	18.37
Standard Deviation	5.43	4.78	4.29

5.3. Discussion

As ubiquitous learning tools in the context of AIGC, e-portfolios and MOOCs play a positive role in improving students' English self-learning ability, which was confirmed by the team members through this experiment. According to the experimental data, although the score increase between Week 8 and the Start was smaller, in the Week 16 test, students' English scores were significantly higher than those at Week 8. Simultaneously, in the three experimental tests, the overall student scores gradually improved, i.e., English self-learning ability improved, reflecting that students' acceptance and initiative in using the E-Portfolio MOOC model for English learning were good.

In the context of AIGC, self-learning and lifelong learning abilities have become essential basic qualities for individuals. This experiment required students to engage in online MOOC learning in their spare time, conducting "ubiquitous learning" in a free learning environment, arranging their own study time, marking key learning points, completing post-class exercises, and participating in online discussions. At the same time, for points they didn't understand, they only needed to click the mouse to find solutions, fully utilizing the autonomy of learning and exercising students' self-learning ability. The e-portfolio in the experiment recorded each student's learning outcomes in different aspects and at different stages. The outcomes were organized and uploaded by the students themselves, giving each student an opportunity to perform, which is conducive to the exploration of students' multiple intelligences, facilitates reflection, and intensifies reflection during the learning process, and is also a cultivation of their self-learning ability.

However, this experiment still has shortcomings: Firstly, the experimental period was relatively short, making it impossible to determine the extent of improvement in students' self-learning ability from long-term application of this model. Secondly, when team members set the test papers to evaluate students' self-learning ability, although they consulted relevant materials and sought advice from the supervising teacher, there may still be flaws in whether the test questions could comprehensively evaluate the improvement of students' autonomous ability during the experimental period. Thirdly, the monitoring methods during students' self-learning were based on the experiment's "Integrity Agreement", supplemented by e-portfolio records and learning progress records on the web pages, making it difficult to fully guarantee students' learning efficiency during MOOC attendance. Finally, the combination of MOOC and e-portfolio in this project is in its initial stages, with relatively lacking theory and case studies; research on the cultivation of students' English self-learning ability through E-Portfolio MOOC needs further development.

Disclosure statement

The authors declare no conflict of interest.

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