

## Research Article

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# Dynamic evaluation of college English writing ability based on AI technology

<https://doi.org/10.1515/jisys-2022-0020>

received June 24, 2021; accepted December 22, 2021

**Abstract:** To accurately evaluate and improve college students' English writing ability, this article proposes a dynamic evaluation method of college English writing ability based on artificial intelligence technology. First, a dynamic evaluation model of college English writing ability is constructed. Second, the index system of English writing dynamic evaluation model is established. Based on this, the dynamic evaluation of college English writing ability is realized. The experimental results show that the design method in this paper can effectively realize the dynamic evaluation of the writing process. After the application of the design method, the number of students interested in writing has increased by 37.8%, and the enthusiasm of students to participate in writing has been improved, with a view to providing some help to improve students' English writing ability through this research.

**Keywords:** AI technology, English writing, ability evaluation, college students

## 1 Introduction

The teaching of writing is a weak link in English teaching. At present, the cultivation of writing ability has become the most difficult link in college English teaching [1]. Summative evaluation is the main method in college English teaching of writing. Its evaluation method is relatively simple, which is not conducive to the improvement of students' writing ability [2]. To accurately evaluate and improve college students' English writing ability and realize the improvement of students' writing ability, it is necessary to design a new and effective dynamic evaluation method of college English writing ability. Therefore, this article makes a dynamic evaluation of English writing ability combined with artificial intelligence (AI) technology and introduces the concept of AI dynamic evaluation of college English, the teaching of writing. This article expounds it from three aspects: prewriting guidance, independent writing, and hierarchical teaching. First, a dynamic evaluation model of college English writing ability is constructed. Based on this, an index system of English writing dynamic evaluation model is established to evaluate teaching quality and English writing ability. Finally, the dynamic evaluation of college English writing ability is realized. It is expected to provide some help to stimulate students' enthusiasm to participate in writing, improve students' English writing ability, ensure students' English learning and mastery, and flexibly use teacher evaluation, peer evaluation, and self-evaluation in the process of writing.

## 2 Literature review

At present, to accurately evaluate and improve college students' English writing ability, many experts and scholars have studied it. For example, McDonough et al. studied a teacher-based evaluation method for

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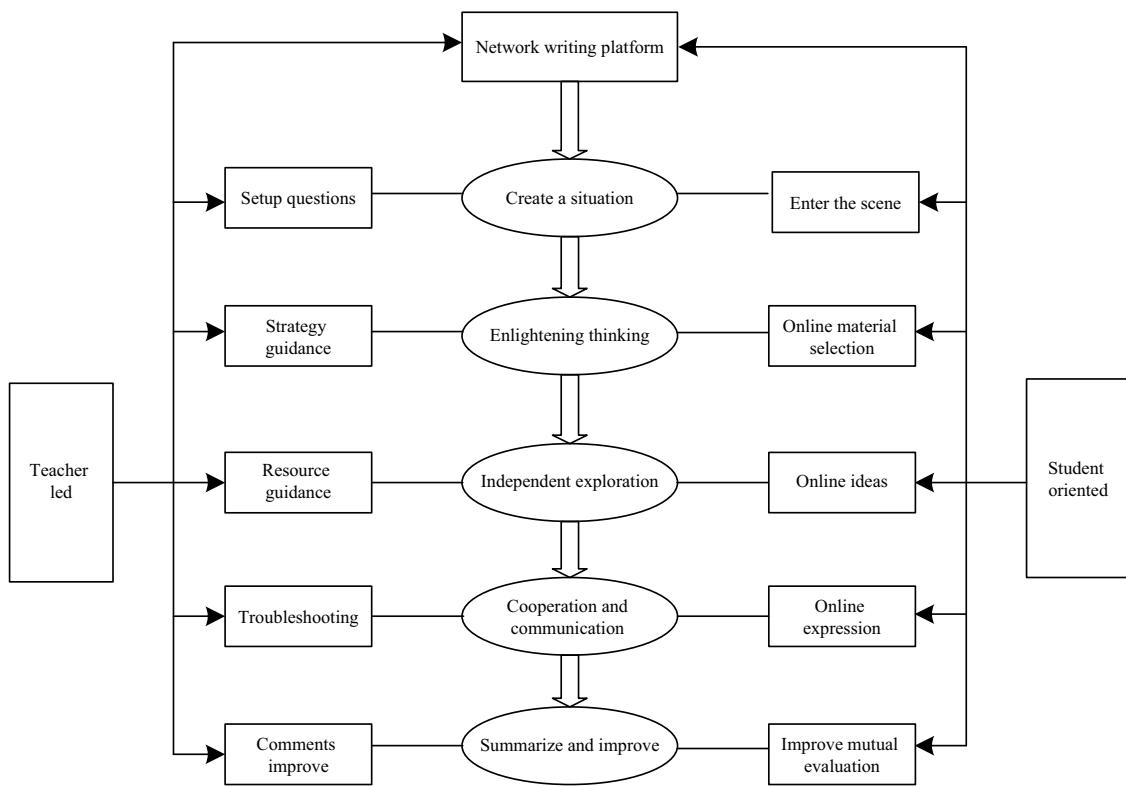
business students' writing and discussed the relationship between students' language use and teachers' thesis scores [3]. It reveals that undergraduate business students' writing comments are evaluated by their tutors, theoretical integration, and thesis structure. This article analyzes the error rate, vocabulary complexity, vocabulary diversity, and phrase complexity to realize the dynamic evaluation of students' writing ability; Zhao studied the application of formative evaluation in the teaching of writing and pointed out that the formative evaluation is a method to improve teaching activities in the process of education and teaching and to evaluate students' academic performance and teachers' teaching effect in real time to provide effective feedback for teachers and students and ensure teaching quality [4]; Sun used the fuzzy comprehensive evaluation method to evaluate the learning effect of peer review and established the evaluation index system and weight of students' learning ability to complete the peer review learning method [5]; Wang studied an automatic evaluation method of college English teaching of writing based on juku error correction network, and made an empirical study on the application of juku error correction network in college English, the teaching of writing [6]; Liu studied an evaluation of students' IELTS writing ability based on machine learning and neural network algorithm, and evaluated students' writing ability according to the established measurement and evaluation indexes [7]; Scott and Ahmed studied a writing learning method to improve students' evaluation of scientific network resources and designed a scaffolding and low-risk homework sequence to meet English learning needs to improve the effect of evaluation and reduce evaluation links [8]; Kutney also studied the evaluation of students' writing. Teachers imagine that they are cooperating with serious learners with four different roles or "visions" (direct, ideal, imitation, and intrusion) to deepen the evaluation effect and achieve the evaluation purpose [9].

### 3 Dynamic evaluation of college English writing ability

#### 3.1 Construction of dynamic evaluation model of college English writing ability

AI algorithm, also known as "soft computing," includes genetic algorithm, simulated annealing algorithm, dynamic evaluation method, and other methods, which are widely used at present. AI algorithm refers to the intelligent analysis algorithm inspired by nature and imitated its structure. To realize the dynamic evaluation of college English writing ability, this study mainly adopts the dynamic evaluation method in AI algorithm because the dynamic evaluation method can accurately search the indicators of college English writing ability evaluation and realize the dynamic evaluation of college English writing ability according to the indicators. On the one hand, college English teaching of writing should be connected with students' real feelings, interests, and needs. Teachers should inspire students to think purposefully and systematically, so that students can master English writing strategies and skills, to improve their writing ability. The design of college English teaching writing mode should consider students as the main body, consider students' actual needs as the main reference, consider English writing strategy training as the auxiliary means, provide full play to the advantages of teaching resources and means brought by modern educational technology, optimize the teaching of writing process, improve the writing evaluation mechanism, and mobilize students' enthusiasm to participate in writing. Based on the above thinking, the author attempts to construct a writing environment of dual subject and multiple dynamic evaluation teaching mode, so that students can learn English writing in cooperation, to improve their writing ability. The teaching process of dual subject and multiple dynamic evaluation in English writing are shown in Figure 1.

As can be seen from Figure 1, both teachers and students are important subjects in the process of writing teaching. Therefore, it is necessary to dynamically evaluate the creation of situations, enlightening thinking, and independent exploration from the perspectives of teachers and students. For example, when evaluating independent exploration ability, students need to put forward their own ideas online and teachers need to provide resource guidance to complete the evaluation of independent exploration capability. The same is true for other evaluations.



**Figure 1:** Teaching mode of English writing based on multiple dynamic evaluation.

The dynamic evaluation of college English writing contains the characteristics of process, focusing on the diachronic development process of students' learning, emphasizing the observation and evaluation of students' progress and change across multiple time points, so as to understand the characteristics and potential of students' dynamic cognitive process and cognitive ability change, and help teachers understand students' learning situation more comprehensively. This feature is consistent with the essential feature of writing because in essence, writing is a complex cognitive process of cycle and interaction rather than the final result of an action. Therefore, in the teaching of English writing, evaluation should not only focus on the finished product of writing but should be integrated into the whole process of students' writing and complement the teaching process of writing. Under such an evaluation system, teachers can always pay attention to the difficulties that students may encounter in the process of writing and provide all kinds of intervention support that they may need. At the same time, these intervention activities can help teachers make a more comprehensive and accurate judgment of students' writing ability and, based on this, design the next "scaffolding" intervention support activities. In addition, students' performance in each link can help teachers obtain teaching feedback information, improve teaching management, and improve students' cognitive ability, thinking ability, and writing ability. The design of the dynamic evaluation system of college English teaching of writing should include proper guidance of writing methods, sufficient input of effective writing reference resources and incentive measures to maintain students' writing motivation. Based on this, the structure of the intervention activities of the dynamic evaluation of English writing is optimized, as shown in Figure 2.

As shown in Figure 2, dynamic evaluation emphasizes interactivity, which is to ensure the exchange and communication among teachers, students, and teaching resources, so that the reversibility of this interaction covers the whole evaluation process. The focus factors in each direction not only play their own roles and tasks, but also consider the influence of other factors and participate in the overall evaluation process [10]. Through the interaction in the evaluation, students can further realize the initiative and cooperation in learning English writing, consciously adjust their learning English writing strategies,

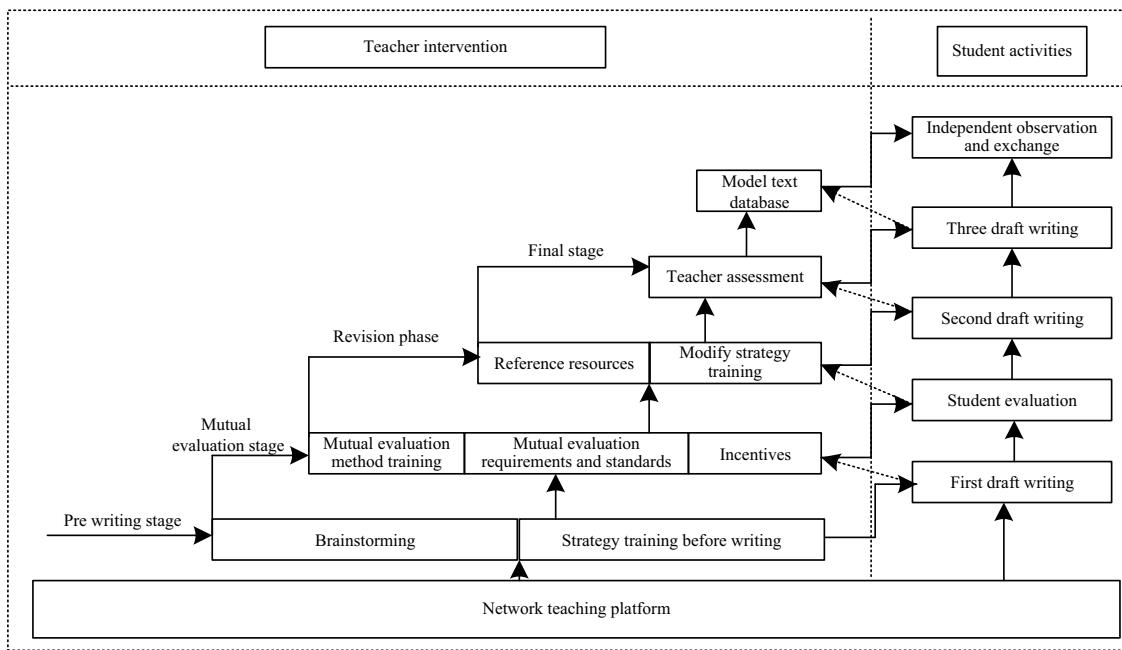


Figure 2: Structure of English dynamic assessment intervention activities.

improve their English writing skills and abilities, and improve their English writing learning efficiency [11]. In the process of dynamic evaluation, its obvious characteristic is the comprehensiveness of evaluation, which emphasizes to evaluate and revise the weight or proportion of each factor from multiple points. When the evaluation result is good, the feedback in the model index system is marked as positive feedback, and the correction value is maintenance. When the evaluation result is qualified or not ideal, the feedback in the model index system is marked as negative feedback, and the correction value is reinforcement, so the weight of this factor should be strengthened [12]. The process of writing is a cyclic, complex, and abstract process. In the process of English writing evaluation, we should not simply focus on the finished writing products but pay attention to the points of various influencing factors and provide students with various kinds of interventional support as far as possible [13]. The evaluation model has changed the previous one-way evaluation, focusing on multidirectional evaluation, and established an evaluation system in which students, teachers, and teaching resources evaluate, learn from each other, participate in, and interact with each other. It can promote the integrity of the evaluation process and multichannel feedback, fully tap students' English writing potential and master the dynamics of students' English writing ability to the greatest extent, respect students' personality differences, and comprehensively and objectively evaluate students' development direction.

### 3.2 Dynamic evaluation index of college English writing ability

To improve students' writing ability, it is necessary to establish a dynamic evaluation index of college English writing ability. In the process of English writing evaluation, the teachers approve students' English writing works and point out the existing problems. At the same time, they require students to rewrite to effectively change the traditional way of correcting English works and improve students' learning effect. Students can clearly understand the problems in their English writing [14]. By pointing out the mistakes in students' English writing, students can correct the mistakes, which is not only conducive to students' awareness of their own writing problems but also conducive to the cultivation of students' language ability and self-correction ability. With the individualized development of students, teachers need to strictly grasp the wording of English writing comments given to students; otherwise, it will affect students' enthusiasm

and confidence in writing [15]. Therefore, teachers need to evaluate the highlights of students' English writing works to improve students' interest in writing. The same teaching teacher needs to have a unified standard of composition evaluation. If the teaching teacher has different evaluation methods for students' English writing works, the students do not know how to adjust their English writing methods, which seriously affects the students' English writing ability. The way students recognize each other's English writing works is not only conducive to the improvement of students' English writing ability but also enables students to recognize their shortcomings in other people's English works and learn from others' advantages to improve their English writing level [16,17]. Based on this, the following index system is designed to reflect the evaluation criteria and results, feedback values, and correction methods of various factors in the dynamic evaluation model. The evaluation results are divided into four grades: A: excellent, B: good, C: qualified, and D: unsatisfactory. Feedback is divided into two levels: A: positive feedback and B: negative feedback. Correction is divided into two ways: A: maintenance and B: reinforcement. Based on this, the index system of dynamic evaluation model of English writing is constructed, as shown in Table 1.

**Table 1:** Index system of dynamic evaluation model for English writing

Focus lens and weight	Focus factor and weight	Focus factor evaluation criteria	Evaluation results	Feedback	Correct
Students 50–70%	Writing foundation	Solid foundation, master knowledge, clear goal, can learn, and positive emotional experience	A B C D	A B	A B
	Writing methods	It has its own unique learning style, can fully mobilize the five senses, and has strong information collection and processing ability	A B C D	A B	A B
	Interest in writing	Can self-control, thirst for knowledge, focus, actively participate in the discussion, answer questions, and unique career	A B C D	A B	A B
	Teaching method	The teaching style is original, innovative, and integrated with advanced teaching ideas	A B C D	A B	A B
	Teaching task	Reasonable task allocation and creative presentation	A B C D	A B	A B
	Instructional design	They are good at using heuristic and divergent methods to enlighten students	A B C D	A B	A B
	Teaching courseware	Knowledge, beauty, openness, and foresight of courseware	A B C D	A B	A B
	Network resource	Openness, interaction, and deep learning	A B C D	A B	A B
	Platform resources	Stability and reliability, ease of use for teachers and students, real-time evaluation, and compatibility	A B C D	A B	A B

Through the above steps, we can establish the index system of the dynamic evaluation model of English writing and continue to use the dynamic evaluation method to convert multiple highly correlated variables in Table 1 into multiple independent comprehensive variables to reduce the dimension of the original sample. Suppose the sample matrix  $X = (X_1, X_2, \dots, X_n)$ . Each sample has  $m$  characteristic indices  $X_i = (X_{i1}, X_{i2}, \dots, X_{in})$ ,  $i = (1, 2, \dots, m)$ , for example, the correlation coefficient matrix of sample matrix  $X$ , then:

$$R_X = \frac{\sum_{i=1}^n (X_i - E(X)) \cdot (X_i - E(X))^T}{E(x)n} = a \cdot a^T, \quad (1)$$

where

$$E(x) = \frac{\sum_{i=1}^n X_i}{\sqrt{n}}, \quad (2)$$

where  $X$  represents the standardized sample matrix. If the eigenvalue of  $R_X$  is  $\lambda$ , the following formula can be established:

$$R_X \cdot w_i = \lambda_i \cdot w_i, \quad i = (1, 2, \dots, m). \quad (3)$$

Let the eigenvector matrix be  $w = [w_1, w_2, \dots, w_m]$ . The new sample matrix  $M$  can be obtained by formula calculation [18]. The  $M$ -dimensional sample matrix is transformed into an equidimensional sample matrix, in which any element  $M_{ij}$  represents the  $j$  principal component of  $x_i$  sample. The formula shows the calculation method of the cumulative contribution of the first  $p$  principal component.

$$M = a \cdot w_i^T. \quad (4)$$

When the cumulative contribution rate  $C_{1-p} > 0.8$ , the original principal component  $p$  is used as the initial characteristic index instead of the original principal component  $m$  as the initial characteristic index.

$$C_{1-p} = \frac{\sum_{u=1}^p \lambda_u}{\sum_{m=1}^w \lambda_m}, \quad (p < m). \quad (5)$$

To accurately predict students' English writing performance, it is necessary to have a complete and reliable historical data [19]. This study first considers many factors that affect students' English writing performance, consulting a large number of relevant literature, combined with expert opinions in the field of English teaching, establishing an evaluation system of students' English writing performance, which includes 12 evaluation indicators. Each indicator is scored with 10 points and gives a detailed scoring standard [20]. By means of interview and written examination, 25 English teachers rated the compositions (including argumentative papers, charts, letters, etc.) of two classes (a total of 60 students). To ensure the correctness of the data, the tendentious data in the original data were removed, and the scores of each index in the 60 samples were removed from the three lowest points. To avoid the influence of subjective factors in the evaluation process as far as possible, the weight of 12 indicators is calculated by using information entropy method, and the linear weight of 12 indicators is considered as the final evaluation result [21,22].

Based on the data in Table 2, the evaluation of teaching ability can better improve the dynamic evaluation effect of English writing ability and put forward corresponding improvement plans for English writing methods.

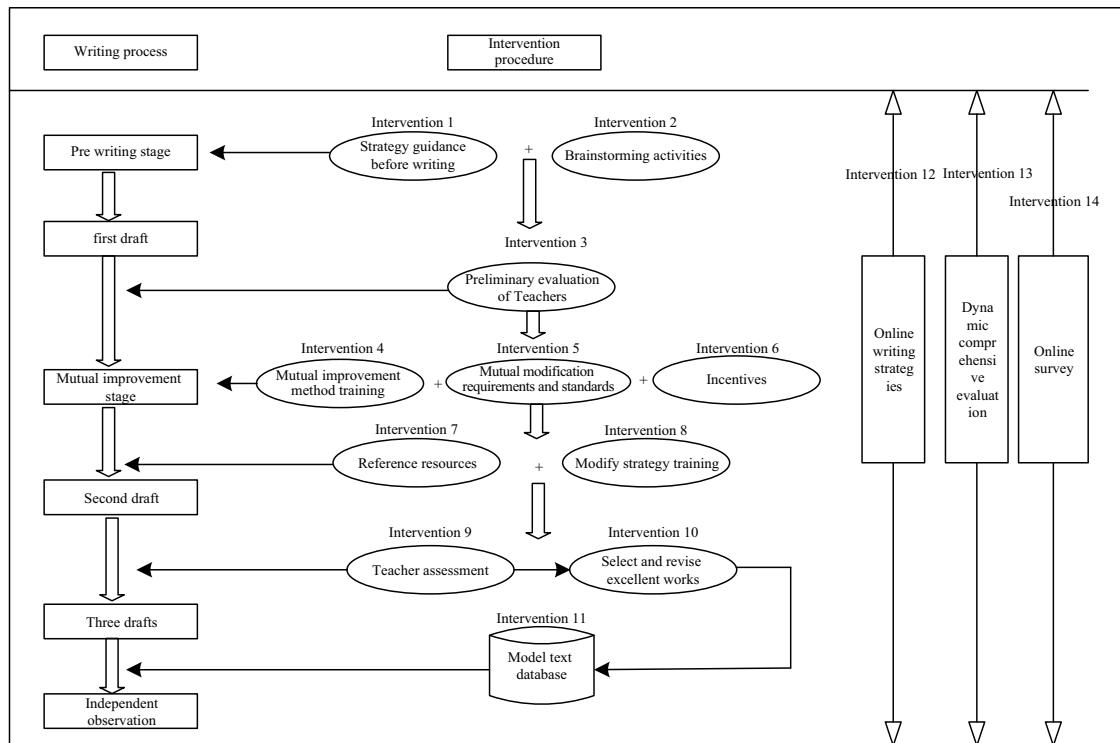
**Table 2:** Original data of students' English writing evaluation

Sample number	$X_1$	$X_2$	$X_3$	...	$X_{10}$	$X_{11}$	$X_{12}$	Evaluation results
1	9.32	9.56	9.78	...	8.59	8.42	8.24	8.72
2	8.47	9.18	8.92	...	8.22	8.18	6.71	8.44
3	9.10	9.21	9.63	...	8.47	9.23	8.20	8.94
4	8.63	8.30	9.26	...	8.06	8.23	6.49	8.24
5	8.31	8.69	9.58	...	6.74	6.72	5.30	7.17
:	:	:	:	...	:	:	:	:
56	9.11	8.27	9.09	...	8.50	7.11	7.23	8.16
57	9.31	8.02	9.10	...	6.92	7.21	7.26	7.70
58	9.08	7.30	8.81	...	8.03	6.96	6.86	7.45
59	7.56	8.29	7.33	...	5.9	6.91	6.04	7.23
60	7.64	8.11	7.55	...	6.0	7.21	6.11	7.27

### 3.3 The realization of dynamic evaluation of English writing ability

Dynamic evaluation theory points out that English evaluation is inseparable from English teaching activities. The improvement of students' ability to comprehend needs teaching intervention. Therefore, teachers

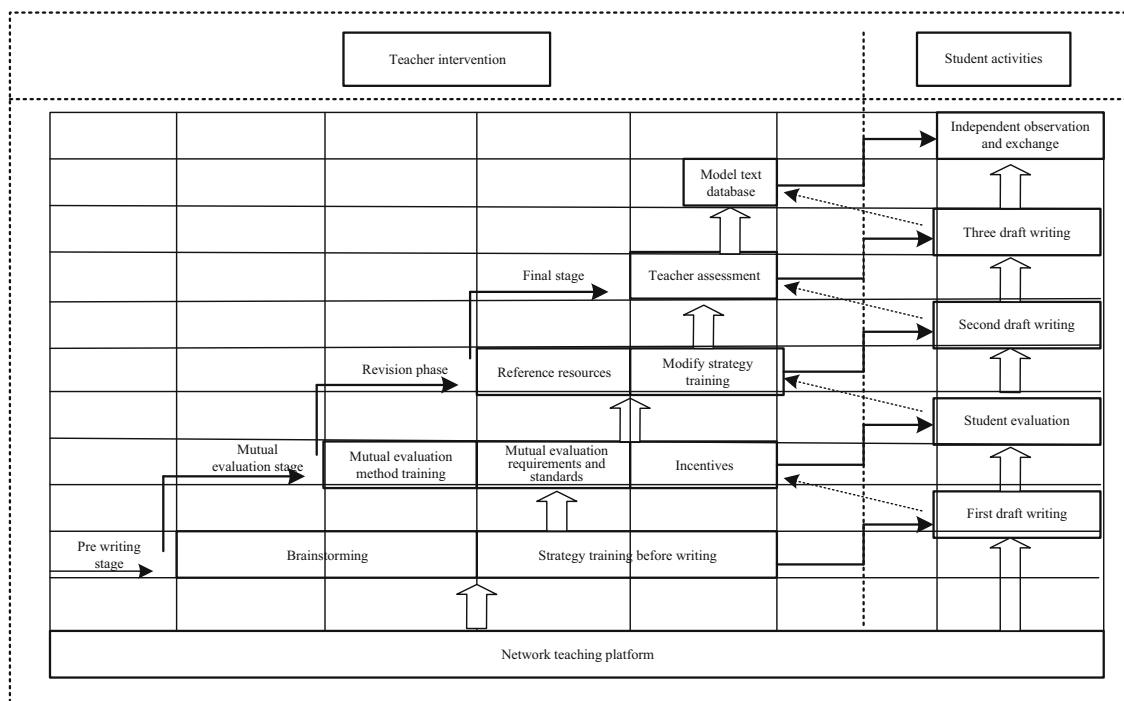
can combine English evaluation with English teaching activities to find students' problems in time and improve students' writing ability. In this process, English teachers need to give different teaching design and evaluation methods according to students' different writing ability, so that the writing ability of all students can be further improved. Based on the online teaching of writing system and process writing theory, this article focuses on the whole process of writing, including prewriting, first draft, mutual modification, revised draft, teacher evaluation, final draft, and other stages, and makes an overall systematic design of D/A mode, and optimizes the process of dynamic evaluation of English writing based on AI technology, as shown in Figure 3.



**Figure 3:** The procedure flow of dynamic assessment of English writing based on AI technology.

At present, there are two kinds of dynamic evaluation models of English writing, namely the intrusive dynamic evaluation method and the interactive dynamic evaluation method. Among them, the interactive dynamic assessment model needs to follow the prepared prompt steps, and the interactive dynamic assessment model is an open communication method between teachers and students. Therefore, teachers can combine English evaluation with English teaching activities to find students' problems in time and improve students' writing ability. To avoid this problem, teachers need to intervene and guide. At the same time, when designing the dynamic evaluation system of college English teaching of writing, we need to explore some interactive ways and constantly improve the interactive ways to effectively control the emergence of learning disabilities. Students can complete the task by themselves by grouping and querying the resources in the above columns. The teacher corrects it, points out its advantages and disadvantages and specific improvement methods, uploads the title of the excellent work for students' reference, and guides students to complete the third draft. It is also a place for students to answer questions and give strategic guidance. Based on this, this article optimizes the process of college English writing assessment, as shown in Figure 4.

To better evaluate the whole process of writing teaching, this article formulates the dynamic comprehensive scoring standard. First of all, we need to constantly refine the composition evaluation standards and score the whole content, language expression, overall structure, and whole content of the English



**Figure 4:** Optimization of college English writing assessment process.

writing works; Second, we should grade students' compositions again, understand the changes of students' writing ability, correctly guide students to write English according to the problems found, and improve students' English writing ability.

## 4 Experimental results

To ensure the reliability of the scoring procedure, all students' compositions were independently evaluated by two teachers. Pearson correlation coefficient between the two teachers was tested: there was a positive correlation between the two teachers,  $r = 0.7982$ ,  $n = 480$ . There was a significant difference between the scores of the experimental group ( $m = 64.854$ ,  $SD = 14.92$ ) and the control group ( $M = 48.958$ ,  $SD = 12.35$ ). Conditions:  $T (14) = 4.98$ ,  $P < 0.001$ . Based on this, the  $T$  value, test results are standardized as shown in Table 3.

**Table 3:**  $T$  value test results

Group	Number	Average value	Standard deviation	$T$
Experience group	8	64.854	14.92	4.98
Control group	8	48.958	12.35	

Before the experiment, the students in the experimental class were investigated with the questionnaire on English learning of English majors, and the results are listed in Table 4.

The results of the questionnaire on students' understanding of English learning before the experiment are also analyzed. The results are shown in Table 5.

**Table 4:** Survey of students' English writing learning

Item	Statistics of options and percentage				
	Kindergarten	Primary school	Junior middle school	High school	University
Time to start learning English	0	3.9	96.1	0	0
Time to start learning English Writing	Kindergarten	Primary school	Junior middle school	High school	University
	0	0	100	0	0
Feel the best aspect of your English composition	Ideological content	Organization structure	Language expression	Writing norms	Nothing
	5.9	5.9	21.6	54.9	11.7
What I feel I need to improve most in my composition	Ideological content	Organization structure	Language expression	Writing norms	Nothing
	27.5	5.9	60.8	5.9	0.0
Before going to college, the English score is at the level of the class	Excellent	Good	Secondary	Commonly	
	5.9	27.5	93.2	27.5	
Study time of extracurricular English training class since entering university	≤4 h	4–7 h	7–14 h	14–20 h	≥20 h
	39.2	43.1	17.7	0	0
Do you have any foreign pen pals?	Yes	No			
	2	92			
Do you take all kinds of English tests in your spare time	Yes	No			
	0	100			

**Table 5:** Students' understanding of English writing before the experiment

Item	1	2	3	4	5	Percentage
Like English writing	3.9	25.5	15.7	52.9	2.0	
Good compositions are constantly revised	0.0	0.0	0.0	54.9	45.1	
English writing ability needs to be improved through continuous practice rather than being taught by teachers	5.9	33.3	0.0	49.0	11.8	
My English writing should be evaluated by teachers, not by myself or my classmates	5.9	21.6	0.0	60.8	11.8	
The teacher is the leading role in English teaching and students should cooperate with the teacher	0.0	60.8	0.0	27.5	11.8	
The key to success in English learning lies in yourself	0.0	9.8	0.0	45.1	45.1	
As long as I work hard, I will learn English well	0.0	21.6	0.0	33.3	45.1	
It is not helpful to improve English writing to revise composition by oneself	5.9	27.5	0.0	66.7	0.0	
As long as you master English learning methods, you will learn English well	0.0	33.3	0.0	51.0	15.7	
I do not like to revise my composition	5.9	29.4	0.0	54.9	9.8	
It is very helpful to improve students' English writing when correcting their compositions	0.0	17.6	60.8	21.6	0.0	
Computer and Internet cannot provide reliable and effective judgment for English composition	0.0	0.0	80.4	19.6	0.0	

It can be seen from the data in the table that although only 54.9% of the students in the experimental class like to write in English, most of the students still hold a positive attitude toward their own efforts in English writing, and 100% of the students think that good articles are constantly revised; 60.8% of the students think that English writing ability needs to be improved through continuous practice rather than taught by teachers; 90.2% of the students think that the key to success or failure of English learning lies in themselves; 78.4% of the students think that as long as they work hard, they will learn English well; 66.7% of the students think that if they master English learning methods, they will learn English well. To understand the influence of D/A mode Practice on students' understanding of English writing in the experimental

class, the same questionnaire survey was conducted after the experiment, and the statistical results are shown in Table 6.

**Table 6:** Students' understanding of English writing learning after the experiment

Number/percentage (%) Item	1	2	3	4	5
<b>Like English writing</b>	<b>0.0</b>	<b>7.8</b>	<b>0.0</b>	<b>82.4</b>	<b>9.8</b>
Good compositions are constantly revised	0.0	0.0	0.0	47.1	52.9
English writing ability needs to be improved through continuous practice rather than being taught by teachers	3.9	17.6	0.0	58.8	19.6
My English writing should be evaluated by teachers, not by myself or my classmates	13.7	35.3	0.0	43.1	7.8
The teacher is the leading role in English teaching and students should cooperate with the teacher	0.0	82.4	0.0	15.7	2.0
The key to success in English learning lies in yourself	0.0	9.8	0.0	45.1	45.1
As long as I work hard, I will learn English well	0.0	21.6	0.0	31.4	47.1
It is not helpful to improve English writing to revise composition by oneself	9.8	78.4	0.0	11.8	0.0
As long as you master English learning methods, you will learn English well	0.0	29.4	0.0	54.9	15.7
I do not like to revise my composition	15.7	58.8	0.0	23.5	2.0
It is very helpful to improve students' English writing when correcting their compositions	0.0	9.8	0.0	64.7	21.6
Computer and Internet cannot provide reliable and effective judgment for English composition	21.6	64.7	0.0	9.8	0.0

It can be seen from the table that only 54.4% of the students in the experimental class like to write in English before the experiment, and the proportion increases to 92.2% after the experiment, which fully shows that the reform of the evaluation mode of the teaching of writing has greatly aroused the students' interest in English writing. On the understanding of their own efforts in English writing, although compared with before the experiment, more students think that their efforts in writing, including constant revision, contribute to their success in writing. This shows that students have formed a relatively stable consensus on English learning, and their writing ability has been significantly improved after the evaluation of multiple methods, which proves that this method has a high practical value.

## 5 Analysis and discussion

To accurately evaluate and improve college students' English writing ability, this study introduces the dynamic evaluation method into this field and puts forward a dynamic evaluation system of college English, the teaching of writing based on AI technology. The experiment shows that the introduction of this method has greatly stimulated students' interest in English writing. More students believe that their efforts in writing, including continuous review, contribute to their success in writing. This shows that students have formed a relatively stable consensus on English learning. After a variety of evaluation methods, students' English writing ability has been significantly improved, which proves that this method has a high practical value. The reason for this effect is mainly related to the following three reasons.

- (1) The application of AI algorithm can accurately search the indicators of college English writing ability evaluation, realize the dynamic evaluation of college English writing ability according to the indicators, and improve the scientificity of the evaluation process.
- (2) Based on the application of AI algorithm, this article also constructs an English teaching of writing model based on multiple dynamic evaluation, obtains the incentive measures that should be included in the dynamic evaluation system of English, the teaching of writing, and optimizes the intervention activity structure of English writing dynamic evaluation.

(3) The dynamic evaluation index of college English writing ability constructed in this article comprehensively analyzes many aspects, which can realize the comprehensive evaluation of college English writing ability and improve the comprehensiveness of the evaluation.

Because of the above advantages, this design method can accurately evaluate and improve college students' English writing ability and realize the improvement of students' writing ability.

## 6 Conclusion

To accurately evaluate and improve college students' English writing ability, this article introduces the dynamic evaluation method into this field and puts forward a dynamic evaluation system of college English teaching of writing based on AI technology. First, a dynamic evaluation model of college English writing ability is constructed. Then establish the index system of the dynamic evaluation model of English writing. Based on this, the dynamic evaluation of college English writing ability is realized. The experimental results show that the design method can effectively realize the dynamic evaluation of the writing process, and after the application of this method, the number of students interested in writing has increased by 37.8%, so as to improve students' enthusiasm to participate in writing, to provide some help to improve students' comprehensive English level.

**Conflict of interest:** Authors state no conflict of interest.

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