An analysis of time commitment for college students to online English writing and peer assessment learning

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Abstract

Online English writing and peer assessment have always occupied an important place in the assessment of composition at the basic education level as an important writing style and assessment tool. Therefore, this paper constructs the IOA-English analysis model based on the intelligent optimization algorithm as the theoretical basis. An in-depth study of online English writing patterns and the time devoted to them, and the intensity and effectiveness of peer assessment among college students. The results of the study are as follows: the computational analysis shows that the time required for the pre-writing preparation stage is 5-10 minutes, with a difficulty factor of 0.3. The final draft submission phase required the least amount of time, 3-7 minutes, with a difficulty factor of only 0.1. The writing revision stage, the most important stage, takes 10-15 minutes and has a difficulty factor of 0.6. The time for the writing revision phase can be divided into two parts: the first part is the time for tasting the model essay, which is about 3-8 minutes. The second part is the writing and revision time, which is about 12-17 minutes. More than 91% of the students were aware of the importance of peer assessment and were brave enough to express their opinions in cooperative learning and to take care of each other’s learning needs in peer assessment.

Keywords: English writing; Peer-to-peer assessment; Pattern analysis; Intelligent optimization algorithm; Online writing
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1 Introduction

In the process of learning English, most students pay attention to oral training but neglect the importance of writing [1-2]. Expanding opportunities to practice written expression, especially writing long compositions, can promote students to do more comprehensible output. CH FANG [3] emphasizes: Writing plays the most obvious role in the development of English listening, speaking, reading, writing and translating skills, and plays a key role in the whole process of “carrying on from the top to the bottom”. Compared to speaking, writing allows some time for mindful reflection and attention to the accuracy of each word [4-5]. According to Jiang [6], Writing is an output skill, and it is a “comprehensible output.” Only when what is learned is fully understood can one know how to utilize it accurately in the writing process. Only when top-down understanding of language meaning is achieved can real language output be realized, and the completion of the output process will definitely lead to progress in language ability. Assuming that these outputs receive timely and effective feedback, the results obtained will be even more pronounced. However, the teaching of English writing has always been a poor strength process of English teaching in Chinese universities [7-8]. Ramírez Balderas [9], through the correction of students’ compositions and the collation of errors, found that the main problems that appeared in students’ writing were: unclear theme, monotonous content, insufficient argumentative arguments; monotonous language, single sentence style; unreasonable structure of essays and sentences. The chapter structure is not well articulated; the basic language skills are not solid. Students are not interested in English writing, and some of them even avoid English for writing practice intentionally because they are afraid of English writing, which makes their English writing ability and writing performance never improve and make progress, and the written compositions have different degrees of problems in terms of ideological content, logical level, grammatical structure and word choice. Whether teachers explain writing knowledge and skills and the length of training time for writing in English writing classes are usually arranged by English teachers themselves [10-11].

The usual teaching tasks of university English teachers are already very heavy, plus it takes a lot of time to correct essays, but the results achieved are not very satisfactory. Therefore, many teachers, because of the misunderstanding of thinking, feel that instead of using their time on marking students’ writing, which has an insignificant rise in effect, they should put more effort on course preparation. Therefore, few teachers can carefully review the content and point out the shortcomings in students’ writing at any time. According to the survey, it can also be found that the time spent on writing training for non-English majors in Chinese universities is seriously insufficient, and the time spent on writing instruction and training in university English classrooms is only about 13.5% of the total semester class time [12-13]. In the setting of textbooks, writing is always placed in the last part of each unit; most teachers use traditional writing training methods, which makes students write for the sake of writing and appear to be very passive; students’ scores in the writing section are low, and all these phenomena hinder the fundamental improvement of English writing [14-15]. With the deep development of China’s modernization and reform and opening up, the demand for excellent talents who are both professional and proficient in foreign languages becomes more and more urgent, which puts forward newer and higher requirements for university English teaching [16-17]. Therefore, it is imperative to change and update the learning concept of college English learners in order to improve the comprehensive English level of college students and promote their comprehensive language ability. In order to adapt to the new situation, the Chinese Ministry of Education has issued the Teaching Requirements for College English Courses, which put forward detailed regulations for college students’ writing ability [18-19]. The relevant regulations require the following: The reason for opening the English teaching course at the university is to systematize and apply the English knowledge students have learned in previous years, especially the communicative skills. To be able to use what they have learned to complete basic application writing, to express their personal feelings,
random thoughts, and the course of events clearly; to express what is to be expressed clearly in precise, non-redundant words, without obvious grammatical errors, within the number of words and time frame specified in the exam [20-21]. College English writing can measure a student’s comprehensive mastery of English, so writing teaching occupies an increasingly important position in college English. Therefore, how to change the weakness of writing teaching in college English so that writing teaching can no longer be a headache for both teachers and students is a research problem worth focusing on [22-23].

Peer review has the same, if not better, effect on improving students’ writing than teacher review, and providing feedback to peers on their writing can also improve the student reviewer’s own language skills. Wang [24] defines peer review as a process in which students evaluate and provide feedback on their peers’ work with reference to a set of criteria. Sumtsova [25] defines peer assessment as the process by which learners in the same learning environment evaluate the quantity, value, and quality of their peers’ work. In the context of teaching English writing, Fathi [26] considers peer assessment as a writing learning activity in which peer learners review each other’s writing texts and point out the problems in each other’s writing texts and provide feedback suggestions to their peers. In the process of evaluation, learners construct knowledge and form skills through higher-order thinking activities on the one hand; on the other hand, learners can interact with each other emotionally and promote each other [27-28]. It was found that second language learners as a whole can positively perceive the role of peer mutual evaluation in improving their language skills and cognitive level [29-30]. In view of the fact that the main purpose of peer assessment is to point out problems, which is essentially a “face-threatening and harmonious activity,” teachers need to guide and regulate students according to their perceptions in order to maximize the advantages of mutual assessment, so that students can effectively reflect on the writing process in the process of evaluating others and receiving evaluation, and thus improve The students can reflect on the writing process effectively and improve their writing ability. What is the current situation of peer assessment of college students’ English writing in the Chinese cultural context, i.e., how learners perceive peer assessment, needs to be studied in depth [31-32].

Journals and interviews are effective tools for investigating perceptions of peer mutual evaluation, but scales have the advantage of being more actionable and covering a wider range of topics in larger studies [33-34]. However, these scales are mostly directed to non-language courses, and scales for English second language learners are very rare [35]. In view of this, it is of theoretical and practical significance to compile a set of IOA-English analysis models with good reliability and validity. Through specific studies, the model of online English writing for college students and the time devoted to it, the intensity and effectiveness of peer mutual evaluation are refined.

2 Research on English analysis model based on intelligent optimization algorithm

English analytical models are one of the most important methods to unfold the time invested in online English writing and peer assessment learning for college students. Intelligent optimization algorithms are widely used in the language field. Therefore, this paper takes intelligent optimization algorithm as the theoretical basis to establish English analysis model.

2.1 Study of intelligent optimization algorithms

In general, the Intelligent Optimization Algorithm (IOA) in solving language-based problems can be described as

$$\min \left\{ f(x) : \forall x \in \xi \subseteq \mathbb{R}^d \right\} (f : \xi \rightarrow \mathbb{R})$$  \hspace{1cm} (1)
Where, \( x = (x_1, x_2, \cdots, x_D)^T \) is the design variable, \( f(x) \) is the objective function, \( D \) is the dimension of the optimization variable; \( \forall x_d \in [x_{l_d}, x_U, d] \) are the feasible domains of the variables; \( x_{l_d}, x_U \) denote the upper and lower bounds of \( x_d \), respectively; \( d = 1, 2, \cdots, D \); \( g_i: R^D \rightarrow R \) denotes the inequality as the constraint relation, and \( h_i: R^D \rightarrow R \) denotes the equation constraint relation.

In solving the language-constrained problem on (1), the basic steps of the intelligent optimization algorithm are:

1) Conversion of the objective function. Converting the optimization objective function on the language problem first into an adaptation function that matches the computing environment of some optimization algorithm.

2) Transformation of optimization design parameters. Corresponding the parameter variables of the optimization problem to the individuals in the linguistic evolution, respectively.

3) Transformation of the computational process. The computational steps of the optimization algorithm are mapped to a biological evolutionary process.

If a certain string \( a = (a_1, a_2, \cdots, a_L) \) with a specific length (where \( L \) denotes the length of the string) and the evolutionary variable \( x = (x_1, x_2, \cdots, x_p)^T \) of the intelligent optimization algorithm have a one-to-one correspondence.

\[
a = (a_1, a_2, \cdots, a_L) \Leftrightarrow x = (x_1, x_2, \cdots, x_p)^T
\]

(2)

Then the string \( a \) is defined as the encoding of the evolutionary variable \( x \), denoted by \( a = e(x) \) and \( x \) is defined as the decoding of the string \( a \), denoted by \( x = e^{-1}(a) \).

In general, intelligent optimization algorithms require the fitness function to take a positive value, i.e., the corresponding function \( \Phi: \xi \rightarrow R^+ \) (\( R^+ \) takes a positive domain). (Usually, the functional relationship that corresponds the optimization objective function to the fitness function is:

\[
\Phi(x) = e^{\alpha f(x)}, \Phi(x) = c_f(x) + c_i (c_i, c_f \text{ are taking a constant value}).
\]

If the problem is a constrained optimization problem, the penalty function method can be used to process the objective function \( f(x) \) and convert it to the final fitness function \( \Phi(x) \).

Denoting the language size as \( N_p \) and the optimization algebra as \( \tau(t = 1, 2, \cdots, t_{\text{max}} \) \( t_{\text{max}} \) denotes the maximum operator algebra), the language individual of the \( t \)-th generation can be expressed as:

\[
X^{(t)} = \left\{ x_1^{(t)}, x_2^{(t)}, \cdots, x_{N_p}^{(t)} \right\}
\]

(3)

The number of individuals in language \( X \) is uniformly represented by \( |X| \) in the text and can be repeatedly calculated. Therefore, \( |X^{(t)}| = N_p, t = 1, 2, \cdots, t_{\text{max}} \).

The number of individuals in a language is the type of \( N_p \), denoted:

\[
\xi = \left\{ X = \left( x_1, x_2, \cdots, x_{N_p} \right) : \forall x_e \in \xi, n = 1, 2, \cdots, N_p \right\}
\]

(4)
Let any element $X = (x_1, x_2, \ldots, x_N)$ be an evolutionary language containing $N_p$ individuals. The algorithm evolutionary termination criterion is $\xi \rightarrow \{\text{true, false}\}$, and is generally limited to evolve to the maximum number of iterations $t_{\text{max}}$ or shelf as:

1) Initialization process. Set each evolutionary parameter and operation termination condition; randomly generate the initial evolutionary language $X^{(0)}$; find the corresponding fitness value $\Phi(x_n)(n = 1, 2, \ldots, N_p)$ for each individual $x_n$ in the language, and evaluate it. the iteration count counter $t = 0$.

2) Language evolution process. The evolutionary operator $T_D$ is operated on language $X^{(t)}$ to produce a temporary language $Y^{(t)}$. The corresponding fitness is solved for the individuals in the temporary language and evaluated at the same time.

3) Competitive operation. The next-generation language $X^{(t+1)}$ is generated (and its fitness is calculated) by performing a competition operation on the original language $X^{(t)}$ and the temporary language $Y^{(t)}$.

4) Iteration stopping judgment. If the stopping condition is reached, the operation stops and the computation result is output; otherwise, make $t = t + 1$, and jump to execute (2) to start the next round of iteration.

The algorithm is easy to understand and apply because it contains fewer internal parameters and has a simple structure compared to other evolutionary algorithms. The differential evolutionary algorithm has a memory function for the optimal solution during the evolutionary process, and at the same time, it can use the evolutionary information among linguistic individuals to guide the evolution. Similar to the law of survival among living organisms in nature, the individuals that remain are the dominant ones through their own competition and cooperation with other individuals to keep themselves from being eliminated. Unlike the genetic algorithm, the differential evolution algorithm uses decimal coding and can retain the elite language individuals. In the feasible domain, DE randomly generates the initial language $X^{(0)}$, and the individual components are generated according to equation (3).

$$x_{n,d}^{(0)} = x_{L,d} + \text{rand}() \cdot (x_{U,d} - x_{L,d})(n = 1, 2, \ldots, N_p; d = 1, 2, \ldots, D)$$

(5)

In equation (5), $\text{rand}()$ represents a random number between $(0,1)$, generated once per call.

### 2.2 Study of the IOA-English analytic model

The basic evolutionary steps of the IOA-English analysis model consist of mutation, crossover, and selection, with each operation step corresponding to an execution operator. When the next generation language is generated by iterative operations, for any individual within the previous generation language $X^{(t)}(t = 0, 1, \ldots, t_{\text{max}})$. Firstly, a few individuals of different languages are selected arbitrarily to generate a differential perturbation vector, then a weight is assigned to the differential vector, the magnitude of which reflects the influence of the differential vector on the individuals, and finally it is superimposed with another arbitrarily selected individuals of different languages to generate variant individuals. Crossover operations are performed between the mutant individuals and the target individuals of the previous generation to derive the test individuals. Finally, the test individual is subjected to a selection operation with the target individual of the previous generation, and the
superior performer enters the next generation language to participate in evolution. The above operations are repeatedly performed until the end of evolutionary termination. The mathematical description of the evolutionary process is as follows.

The IOA-English analytic model has increased the linguistic diversity of the algorithm during the evolutionary process, where the variation operations make use of the evolutionary information of the parent linguistic individuals, especially the formation of the difference vector, which has a perturbing effect on the parent individuals. The main types of variation operators are as follows.

1) **DE/rand/1** (abbreviated as \(D_{ER1}\))

\[
v^{(i+1)}_i = x^{(i)}_i + F \left( x^{(i)}_{r_2} - x^{(i)}_{r_3} \right)
\]

Where, \(F\) is the perturbation factor, which is usually taken within \([0, 2]\); \(r_1, r_2, r_3\) and index \(i\) are not equal to each other. The following case is similar.

2) **DE/rand/2** (abbreviated as \(D_{ER2}\))

\[
v^{(i+1)}_i = x^{(i)}_i + F \left( x^{(i)}_{r_1} - x^{(i)}_{r_2} \right) + F \left( x^{(i)}_{r_3} - x^{(i)}_{r_4} \right)
\]

3) **DE/best/1** (abbreviated as \(D_{EB1}\))

\[
v^{(i+1)}_i = x^{(i)}_{best} + F \left( x^{(i)}_{r_1} - x^{(i)}_{r_2} \right)
\]

4) **DE/best/2** (abbreviated as \(D_{EB2}\))

\[
v^{(i+1)}_i = x^{(i)}_{best} + F \left( x^{(i)}_{r_1} - x^{(i)}_{r_2} \right) + F \left( x^{(i)}_{r_3} - x^{(i)}_{r_4} \right)
\]

The ultimate goal of the IOA-English analysis model is to enhance linguistic diversity. By re-mixing the elements of the previous generation of individuals with those of the variant individuals, the test individuals inherit the evolutionary information of the previous generation of languages while taking into account the variant information. The mathematical expression can be expressed as follows:

\[
u^{(i+1)}_y = \begin{cases} v^{(i+1)}_y, & \text{rand} (j) \leq CR \text{ or } j = randn(i) \\ x^{(i)}_y, & \text{rand} (j) > CR \text{ and } j \neq randn(i) \end{cases}
\]

Where, \(\text{rand} (j)\) is a random number within \([0, 1]\) and conforms to a uniform distribution, \(j\) represents the \(j\)th individual element, and \(CR\) is the crossover factor, which takes a range of values \([0, 1]\), and the specific value can be adjusted according to the actual situation. \(randn(i) \in [1, 2, \ldots, D]\), representing the dimensional index, can make at least one of the elements in the test individuals is provided by the variant individuals. From the expression of crossover operator, it can be seen that if the crossover factor is larger, the test individuals are biased toward variant individuals, which is conducive to strengthening the local search ability of the algorithm and can reduce the search time; conversely, the smaller the crossover factor, the test vector is biased toward parent individuals, which is conducive to ensuring linguistic diversity and enhancing the global search ability of the algorithm. In summary, it can be seen that linguistic diversity and search efficiency are two conflicting quantities.
It is assumed that the previous generation of individuals and the test individuals perform one-to-one competitive selection. The superior performer is the child language individual, and this operation process is called the selection operation. Using the objective function language as the target of study, the mathematical expression can be expressed as follows:

\[
x_{i}^{t+1} = \begin{cases} 
    u_{i}^{t+1}, f\left(u_{i}^{t+1}\right) < f\left(x_{i}\right) \\
    x_{i}, f\left(u_{i}^{t+1}\right) \geq f\left(x_{i}\right)
  \end{cases}
\]  

(11)

The DEr1 variant consists of a base vector and a weighted difference vector. All the individuals in these two vectors are arbitrarily selected from the parent languages, which helps to enhance linguistic diversity. However, because no evolutionary information of any language is utilized, this variant approach is more capable of global search and less capable of local search. Setting a very small positive number \( \varepsilon \), if:

\[
\left| \Phi\left(x_{\mu, \text{best}}^{(t)} - x_{\mu, \text{best}}^{(t+1)}\right) \right| \leq \varepsilon (\mu = 1,2)
\]

(12)

The optimal value of the language is determined to change at the end of the \( t + 1 \)th generation, i.e., the language stalls at the \( t + 1 \)th generation, which is called the language optimal value stopping threshold. Given a positive integer \( \delta \) of appropriate size, if the language stalls in successive \( \delta \) generations, the language is considered to be in a local extreme value neighborhood, and \( B \) is called the language iteration stopping threshold.

One of the core elements in the IOA-English analysis model is how to efficiently use the evolutionary information of several search languages to exchange information between languages in a timely manner, so as to stay away from local optimal neighborhoods, avoid unnecessary searches, and accelerate convergence.

The individuals in the inferior language are ranked from superior to inferior, and then the information of the individuals in the elite language is used to guide the top \( N_{0} \) individuals in the inferior language to the elite language for mapping learning to bring the individuals in the inferior language closer to the elite language, and the mapping operator is defined as:

\[
x_{i,g+1} = x_{i,g} + F \times \left( x_{\text{best},g} - x_{i,g} \right) + F \times \left( x_{r,g} - x_{i,g} \right)
\]

(13)

\[
F = F_{0} \times 2^{\delta-\delta_{0}}
\]

(14)

\( x_{i,g} \) is the top \( N_{0} \) individuals in the inferior language; \( x_{\text{best},g} \) is the best individual in the elite language; \( x_{r,g} \) and \( x_{i,g} \) are two different individuals in the elite language, whose difference term \( x_{r,g} - x_{i,g} \) acts as a random perturbation; \( x_{\text{best},g}, x_{r,g} \) acts as a guide for the elite individuals; \( F_{0} \) is the basic scaling factor (\( F_{0} \) is taken as 0.5 in the text); \( \delta \) is the number of successive end iterations of the language optimum, \( \delta_{0} \) is a critical value of \( \delta \), and let \( \delta > \delta_{0} \). This way of parameter setting makes full use of the evolutionary information of the language, and the internal parameters are adjusted in time according to the evolution of the language optimum.

If a language has fallen into a local extremum region as judged by the local extremum criterion. However, it is not possible to find a sub-language individual superior to its own language individual.
in other languages. Then a Gaussian variation strategy will be applied to achieve perturbation for this language. Gaussian distribution function is a common form of distribution in probability statistics, and its density function can be expressed as:

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma}e^{-\frac{(x-\mu)^2}{2\sigma^2}}, -\infty < x < \infty$$ \hspace{1cm} (15)

In equation (15): $\mu$ is the expectation of Gaussian distribution; $\sigma$ is the variance.

The individuals in the local extremum region are first ranked according to their fitness, and then the top $N_0$ individuals in the language are subjected to adaptive Gaussian perturbation. The adaptive Gaussian perturbation operator is:

$$x_i = x_i + (1-\lambda)x_i \times N(\mu, \sigma)$$ \hspace{1cm} (16)

$$\lambda = \frac{t}{N_0}$$ \hspace{1cm} (17)

Where: $N(\mu, \sigma)$ is a Gaussian distributed perturbation vector obeying a mean of $\mu$ and a variance of $\sigma$; $x_i$ is a language individual caught in a local extreme; $1-\lambda$ is a Gaussian perturbation coefficient; $t$ is the specific rank of $x_i$ among the top $N_0$ individuals (i.e., $t \in [1, 2, \ldots, N_0]$). The coefficients are set in such a way that the evolutionary information of the language is fully utilized. So that each individual in the top $N_0$ individuals has a different perturbation coefficient, and the perturbation coefficient can be adaptively adjusted according to its own fitness ranking.

The IOA-English analysis model adopts the idea of multi-variant strategy evolution. So that the advantages between different models can be complemented and better results are achieved. The descriptions of the five test functions are shown below.

1) Sphere function

$$f_1(x) = \sum_{i=1}^{n} x_i^2$$ \hspace{1cm} (18)

The function belongs to the multi-dimensional single-peaked function, used to test the algorithm’s optimization accuracy, theoretically, the function variable has a minimum value of 0 at $(x_1, x_2, \ldots, x_n) = (0, 0, \ldots, 0)$. The range of function variables in the text is taken as $[-100, 100]$.

2) Schwefel 2.22 function

$$f_2(x) = \sum_{i=1}^{n} |x_i| \left( \prod_{i=1}^{n} |x_i| \right)$$ \hspace{1cm} (19)

The same as the Sphere function, the function also belongs to the single-peaked function, theoretically, its global optimum is located at $(x_1, x_2, \ldots, x_n) = (0, 0, \ldots, 0)$, the optimal value of 0, the range of function variables in the text taken as $[-10, 10]$. 
3) Rastrigin function

\[ f_3(x) = \sum_{i=1}^{n} (x_i^2 - 10 \cos(2\pi x_i) + 10) \]  

The function belongs to a multi-peak function, in the field of multi-modal function is very representative, the function form undulating, very jumpy, theoretically, its function variable at \((x_1, x_2, \cdots, x_n) = (0, 0, \cdots, 0)\) can obtain the minimum value of 0, the range of function variables taken as \([-5.12, 5.12]\) in the text.

4) Griewank function

\[ f_4(x) = \frac{1}{4000} \sum_{i=1}^{n} x_i^2 - \prod_{i=1}^{n} \cos\left(\frac{x_i}{\sqrt{i}}\right) + 1 \]  

This function also belongs to the typical representative of multi-peaked function, with many local extreme value points, generally known as the intelligent evolutionary algorithm is more difficult to calculate the function. The global optimal value of the function is located at \((x_1, x_2, \cdots, x_n) = (0, 0, \cdots, 0)\), the minimum value of 0, the range of function variables taken in the text as \([-600, 600]\).

5) Ackley function

\[ f_5(x) = -20 \exp\left(-0.2 \sqrt{\frac{1}{N} \sum_{i=1}^{n} x_i^2}\right) - \exp\left(\frac{1}{N} \sum_{i=1}^{n} \cos(2\pi x_i)\right) + e + 20 \]

The function is a composite function of exponential function and cosine function, also belongs to the type of multi-peak function, with multiple peak points. Theoretically, its function variable can obtain the minimum value of 0 at \((x_1, x_2, \cdots, x_n) = (0, 0, \cdots, 0)\). The range of function variables in the text is taken as \([-30, 30]\).

3 Analysis of English writing and peer assessment time input

3.1 Analysis of the time invested in online English writing

The study was designed to address the issue of time spent in online English writing by college students. According to the actual teaching practice, we combined the modern teaching equipment of the school, criticism network, WeChat, QQ and other online resources, and took the pre-writing preparation stage, writing revision stage, and final draft submission stage as the calculation parameters. The IOA-English analysis model was used to calculate and analyze the results as shown in Table 1. The time required for the pre-writing stage is 5-10 minutes, and the difficulty factor is 0.3. Because of the limited time for online English writing, students can use part of their class time and their after-school time to complete the whole writing process together. The pre-writing stage provides students with the linguistic and opinion scaffolding for their writing, from examining the topic to determining the genre, tense and person, which is optional. The writing revision stage, the most important stage, takes 10-15 minutes and has a difficulty factor of 0.6. The time for the revision stage can be divided into two parts: the first part is the time for reading the model text, which is about 3-8 minutes. The first part is
the reading of the model text, which takes 3-8 minutes. The first part of the lesson is for students to read the model text. The second part is the writing and revision time, which is about 12-17 minutes. After the writing is completed, students do a self-review, peer review and group evaluation. The self-review form needs to be prepared in advance. The peer review form is for peer review in small groups. Students will revise their writing based on their peers’ comments and suggestions. Then, in the next English class, the teacher selects the representative essays of the learning group for group revision and evaluation. Based on the calculation results, the model was reintroduced and the optimal model of online English writing for college students was derived as shown in Figure 1.

### Table 1. Time invested in online English writing by college students

<table>
<thead>
<tr>
<th>Calculated parameters</th>
<th>Output results</th>
<th>Time required by students (minutes)</th>
<th>Difficulty factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-writing stage</td>
<td></td>
<td>5-10</td>
<td>0.3</td>
</tr>
<tr>
<td>Writing revision stage</td>
<td></td>
<td>15-25</td>
<td>0.6</td>
</tr>
<tr>
<td>Final draft submission stage</td>
<td></td>
<td>3-7</td>
<td>0.1</td>
</tr>
</tbody>
</table>

As can be seen in Figure 1, in the pre-writing preparation stage, college students focus on thinking critically about issues and categorizing and evaluating ideas. After brainstorming, students need to refine their writing outline and construct a content schema. At this point, the pre-writing stage is completed. After the revision stage, the teacher summarized the common linguistic errors and problems in students’ writing in the next English class, made suggestions for revision, and distributed the students’ work. Students revise their work several times after class, and interact with the teacher one-on-one using the WeChat, Bebop, or Critique.com platforms. Students will continue to revise their work to produce a final product. The teacher and students select the best work and publish it on the class group, WeChat platform or virtual class platform. The posting stage signals the end of a topic’s writing.

![Figure 1](image-url)  
**Figure 1.** Schematic diagram of the optimal model of online English writing for college students

### 3.2 Analysis of the effect of peer assessment

Essay feedback is an important part of teaching English writing in college. As a major source of feedback and a formative assessment method, peer-to-peer assessment plays an integral role in improving students’ writing skills. Therefore, this section provides a computational analysis of the time invested in peer-to-peer assessment. In order to understand students’ learning in writing learning
and the effectiveness of the online peer assessment activities, the Online English Writing Online Peer Assessment Form was designed, as shown in Table 2. The content of the peer assessment form includes three aspects: essay content, language expression, and chapter structure. Among them, the content of the essay includes 2 sub-themes. Three sub-themes were included in the language expression area and three sub-themes were included in the chapter structure area. The peer rating scale was investigated in the form of a Likert scale using 3 criteria: a 10-point scale, a percentage scale, and a rating scale. The total time required for the input was approximately 25 minutes. The specific performance of students in terms of cognitive depth, affective attitudes, learning behaviors, and skill awareness for deep learning. It was seen as a sign of more effective online peer assessment and brought into the OA-English analysis model. The calculation results are shown in Table 3.

### Table 2. Online English writing network peer assessment table

<table>
<thead>
<tr>
<th>Mutual Evaluation Content</th>
<th>Key Details</th>
<th>Evaluation Criteria</th>
<th>Input time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article content</td>
<td>Degree of subject conformity</td>
<td>0-10 points</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Article points</td>
<td>0-10 points</td>
<td></td>
</tr>
<tr>
<td>Language expression</td>
<td>Percentage of fluent sentences</td>
<td>0-100%</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Percentage of grammatical errors</td>
<td>0-100%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage of excellent phrases</td>
<td>0-100%</td>
<td></td>
</tr>
<tr>
<td>Chapter structure</td>
<td>Reasonableness of paragraphing</td>
<td>Yes/No</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Connecting means and rationality</td>
<td>Yes/No</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen in Table 3, the number of students’ online mutual assessments gradually increased as peer-to-peer assessment progressed. The percentage of mutual assessment in terms of cognitive depth was 45%, and the time invested increased to 15 minutes. This indicates that students are increasingly vocal in their participation in online mutual evaluation activities. No longer do they present fear and lack of confidence in expressing their opinions. The online platform creates just such a relatively safe learning environment and gives students the opportunity to express themselves fully. A comparative analysis showed that the percentage of mutual evaluation in learning behaviors was as high as 52%, and the time invested in mutual evaluation also increased, at 17 minutes. This is because online peer assessment as a learning style also influences students’ specific learning behaviors. After participating in online peer assessment and activities, more than 78% of students would go online to search first when they encountered learning difficulties. The information age of knowledge sharing provides more possibilities for students’ learning, and also improves their ability to solve problems independently. More than 91% of the students realized the importance of peer assessment, expressed their opinions in cooperative learning, and took care of each other’s learning needs in peer assessment.

### Table 3. Network peer assessment effectiveness table

<table>
<thead>
<tr>
<th>Computational Parameters</th>
<th>Percentage of mutual evaluation</th>
<th>Peer assessment input time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive depth</td>
<td>45%</td>
<td>15</td>
</tr>
<tr>
<td>Emotional Attitude</td>
<td>31%</td>
<td>14</td>
</tr>
<tr>
<td>Learning behavior</td>
<td>52%</td>
<td>17</td>
</tr>
<tr>
<td>Skill awareness</td>
<td>28%</td>
<td>21</td>
</tr>
</tbody>
</table>

### 4 Conclusion

Based on the existing research on English writing and peer assessment, we analyze the characteristics of online English writing and peer assessment based on English writing and peer assessment using the IOA-English analysis model as a calculation tool and the relevant functions of the web platform, with a view to further exploring the input time of English writing and peer assessment. The specific findings are as follows:
1) The computational analysis shows that the time required for the pre-writing preparation stage is 5-10 minutes, with a difficulty factor of 0.3. The pre-writing stage provides students with the linguistic and opinionative scaffolding for their writing, from the examination of topics to the determination of genre, tense and person. The final draft submission phase required the least amount of time, 3-7 minutes, with a difficulty factor of only 0.1.

2) The writing revision stage, the most important stage, takes 10-15 minutes and has a difficulty factor of 0.6. The time for the writing revision stage can be divided into two parts: the first part is the time for reading the model essay, which is about 3-8 minutes. The first part is the reading time, which is about 3-8 minutes. Students can enrich the linguistic and content schemas of their writing by reading the model essay. The second part is the writing and revision time, which is about 12-17 minutes. After the writing is completed, students conduct self-review, peer assessment and group evaluation.

3) With the advancement of peer-to-peer assessment, the percentage of mutual assessment in terms of cognitive depth was 45%, and the time invested was increased to 15 minutes. The percentage of mutual evaluation in learning behavior was as high as 52%, and the time invested in mutual evaluation also increased, at 17 minutes. More than 91% of the students were aware of the importance of peer assessment, were brave enough to express their opinions in cooperative learning and were able to accommodate each other’s learning needs in peer assessment.

References