

An Action Research on the Effects of “Production-Oriented Approach” on Senior High School Students’ English Writing

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Abstract

The present study explored the effects of “production-oriented approach” (POA) on senior high school students’ English writing. 8-week action research of English writing in a senior high school in Inner Mongolia, China was carried out. The data were collected through writing tests and the questionnaire to answer the following research questions: What are the effects of POA on the senior high school students’ English writing performance and their critical thinking skills (CTSs)? The research results show that: 1. teaching writing based on POA could improve the language and content of English writing. In specific, concerning language, POA could improve the syntactic complexity, lexical diversity, lexical variation of complexity, fluency, and accuracy of English writing. However, there was no significant effect on the structure of English writing. 2. POA positively influenced students’ CTSs, especially in the dimensions of analysis, curiosity, justice, cognitive maturity, open-mindedness, and tenacity. However, the writing teaching with POA did not influence the dimensions of truth-seeking and self-confidence. Finally, combined with the research findings, some suggestions for improving senior high school students’ English writing and CTSs were put forward, and the limitations of this research and directions for the future research were discussed.

Keywords: action research, critical thinking skills, English writing, production-oriented approach, senior high school students

1. Introduction

Writing as one of the four language skills in foreign language teaching, which not only reflects the learners’ comprehensive language abilities but also helps to stimulate thinking and promote the process of language acquisition. The English Curriculum Standard for Ordinary High School issued in 2022 stipulated that the students should identify and analyze specific foreign languages and other cultural phenomena. More importantly, the students were supposed to have a good command of practical writing competence to answer corresponding questions and fully express their opinions. However, the current situation of English writing in senior high school in China is not satisfactory. There are many problems, such as due to the limited class hours, teachers often neglect writing teaching. Most teachers do not offer special writing strategies to guide students improve their writing performance. Therefore, how to effectively carry out writing teaching has always been one of the major concerns for the middle school English teachers. The present study conducted three rounds of action research to explore the effects of writing teaching with the guidance of “production-oriented approach” (POA) on the learners’ writing performance and CTSs.

2. Literature Review

2.1 Relevant Research on English Writing Based on POA

POA, characterized by its Chinese roots and international perspectives, has attracted the attention of numerous experts from the field of foreign language education. Hyland (2016) utilized POA in writing instruction and affirmed its positive impact on learners’ expressive writing skills and logical thinking. Cumming (2017) suggested that POA is an effective teaching practice that should be extended to various language teaching contexts. Polio (2017), focusing on pre-service teachers, noted that POA could effectively enhance their teaching abilities, but pre-service teachers often overly emphasize task design while neglecting practical application. In

the context of EFL in China, scholars have conducted empirical studies and action research applying POA. For example, Zhang (2017) designed a writing instruction based on POA, conducted an empirical study, and concluded that POA can encourage learners to produce more language items in their writing. Hu (2016) studied the impact of POA on college students' writing and found that output tasks within POA can drive students' learning and application, thereby improving their writing abilities, interest, and confidence. Li (2022) conducted three rounds of action research to explore the effects of POA on high school students' English writing skills and interest, revealing that POA can stimulate students' interest in English writing and significantly enhance their writing abilities. Wang (2023) implemented three rounds of action research and found that POA positively influences high school students' interest in English learning and their autonomous learning abilities.

2.2 Relevant Research on CTSs Based on POA

Scholars conducted relevant research on CTSs, and have recognized that the importance of cultivating students' CTSs in foreign language teaching and learning. Anderson (1989) emphasized that teachers should encourage students to learn independently and evaluate the outcomes of their thinking training. Benesch (2001) pointed out that practice is the only way to develop critical thinking. Tsui (1999) was the first to propose that foreign language teaching should be integrated with the cultivation of critical thinking. Huang (1998) noted that the Chinese foreign language education model often neglects the development of critical thinking, focusing solely on language skills and knowledge. Consequently, many scholars have begun exploring the role of POA in developing critical thinking. For example, Gu' study (2016) indicated that POA can enhance students' cultural literacy and promote the development of critical thinking in university English classrooms. Hao (2020) identified the cultivation of critical thinking as one of the key goals of POA, suggesting that teachers should introduce socially significant topics for students to evaluate when using the POA model. Some studies have developed POA-based teaching models to cultivate CTSs. Fu (2017) analyzed the intrinsic connection between oral English teaching and critical thinking development, introducing POA into oral classes and emphasizing the role of the three-stage process of "motivation, support, and evaluation" in promoting critical thinking. Shi (2019) designed a teaching model to improve both language skills and critical thinking ability, detailing the application of POA in "Integrated English" courses. Li (2021) developed a POA writing teaching model to foster critical thinking in vocational college students, along with detailed assessment standards. Su (2021) explored the cultivation of critical thinking among non-English primary university students by combining the theoretical models of POA and critical thinking. Zhang (2022) applied POA to interpretation teaching and explored how to cultivate students' CTSs through interpreting training.

To sum up, the relevant research on writing applying POA has been focusing on university students as research subjects. Although research on developing CTSs through POA has made some progress, there is still more research space to explore. Research findings indicate that writing teaching by applying POA could potentially cultivate CTSs. Therefore, the present research endeavor to conduct action research to explore the effects of writing teaching with applying POA on senior high school students' writing performance and CTSs.

3. Research Methodology

3.1 Research Questions

This study applies POA to senior high school English writing teaching to explore the effects of POA on the language, ~~writing~~ content, and structure of English writing, as well as on the CTSs of senior high school students, aiming to address the following research questions:

- (1) What are the effects of POA on senior high school students' English writing?
- (2) What are the effects of POA on senior high school students' CTSs?

3.2 The Participants

The participants for this study were 40 Chinese students who were chosen from grade one in a senior high school in a small city in Inner Mongolia, China. Their ages ranged from 16 to 17, and they had at least six years of English learning experience. None of them have ever learned or stayed in an English-speaking country.

3.3 Instruments

English writing tests were used to explore the effects of POA on English writing, and a questionnaire was used to investigate the effects of POA on CTSs.

3.3.1 Writing Tests

The writing tests included the pre-test and the post-test. The pre-test was taken from the midterm exam and required the students to write an email, introducing the school to an exchange student. The post-test was taken from the final exam and required the students to write an email, comforting a friend who did poorly on the midterm exam and offering advice. The pre-test was distributed one week before the first round of action research to assess the current writing proficiency, and the post-test was administered one week after the third round of action research to evaluate the effects of POA on writing. After the action research, three writing drafts were collected as data to analyze to examine the effects of POA on writing performance.

3.3.2 Questionnaire

The questionnaire was adopted from Wen's (2012) critical thinking tendency questionnaire, designed for college students. It was modified for high school students, reducing the number of questions, deleting questions 3 and 11, which were irrelevant to the middle school students. The pre-questionnaire was distributed one week before the first round of action research, and the post-questionnaire was administered one week after the third round of action research. The questionnaire covered the dimensions of analysis, curiosity, self-confidence, truth-seeking, cognitive maturity, open-mindedness, justice, and tenacity. The results of the pilot study with 100 high school students showed that the reliability of the questionnaires was 0.986 and its validity was 0.900.

4. The Three-round Action Research

4.1 The First Round Action Research

4.1.1 Identifying Problems

Several problems were identified in the writing pre-test. Firstly, the students exhibited a limited vocabulary and made numerous errors in their written work. Secondly, some students heavily relied on templates and needed more originality in production. Thirdly, the students had difficulty using cohesive words effectively. The result of the writing pre-test of was presented in the following table.

Table 1. Descriptive Statistics of the Pre-test (N=40)

Item	Min	Max	M	SD
Content	5	9	6.86	1.33
Structure	1	4	2.35	0.75
Total	6	13	9.91	2.08

According to the data presented in Table 1, the students' average writing score was 9.91 out of a total of 15. This indicated that the students' writing proficiency was below satisfactory, failing to meet the senior high school English writing standards.

Furthermore, the students' poor performance in writing also suggested a deficiency in critical thinking skills and logical reasoning abilities. The descriptive statistics of the pre-questionnaire were shown in Table 2.

Table 2. Descriptive Statistics of the Pre-questionnaire (N=40)

Items	Min	Max	M	SD
Analytic	11	25	27.33	2.01
Curiosity	8	29	27.98	2.45
Tenacity	9	26	25.60	3.12
Self-confidence	12	37	31.20	3.40
Truth-seeking	10	32	29.48	2.40
Cognitive maturity	13	44	33.83	2.91
Open-mindedness	6	28	26.50	2.58
Justice	5	23	23.60	1.44
Total	143	224	225.52	7.80

Table 2 indicated that cognitive maturity displayed the highest average which involves being receptive to different problem-solving approaches and demonstrated the capacity to handle unexpected situations. The second highest average was self-confidence, signifying that the students strongly believed in their rational and analytical

skills and were truth-seeking, curious, analytic, open-minded, tenacious, and justice.

4.1.2 Making the Action Plan

To address the issues identified in the pre-test, POA was employed in the writing instruction to enhance students' English writing and CTSSs. The initial phase of the action research spanned two weeks and focused on Unit 2, Travelling Around, which was selected from the first mandatory English textbook.

Stage 1 (Week 1): The primary objective of this stage was to gain a general understanding of the students' current English writing. To achieve this, the teacher summarized the issues identified in the pre-test while the students familiarized themselves with writing teaching applying POA. Consequently, a detailed teaching plan based on POA was implemented.

Stage 2 (Week 2): The topic for the first round of action research was a travel plan. According to the motivating, the students were encouraged to complete the first draft of their travel plans. Similar to the issues observed during the pre-test, challenges arose during the motivating process for the first round. To address these problems, various enabling activities were designed, explicitly targeting the issues found in the first drafts. After engaging in these activities, the students were expected to revise their writing while the teacher collected the second drafts for feedback, self-evaluation, and peer evaluation. Ultimately, the students were required to submit their final writing.

The teaching objectives include language and critical thinking skills.

The objectives of language:

- (1) The students can master the relevant words and language expressions for the preparation of travel planning, such as applying for a credit card, check-in, package tour, flight, brochure, and other adjectives describing tourist attractions, such as unique and unbelievable, as well as their feelings to express their expectations for scenic spots: I have been longing for... It is my dream destination... I am dying to see it. How exciting it is to see...
- (2) The students are supposed to understand and correctly use the present continuous tense for plans and master the structure of email to write travel plans.

The objective of critical thinking skills:

The students are able to identify good or bad behaviors while traveling.

4.1.3 Summary of the Major Problems

After implementing the action plan, several problems were found in the first round of action research. Firstly, the class hours were insufficient. Due to the students' weak English foundation, the teacher had to spend considerable amount of time guiding their writing. Furthermore, the completion of the output texts had to be done by the students after class, but some students displayed a lack of commitment and diligence in their writing attitudes. Secondly, the time allocated for group discussions was limited. They could not express their ideas clearly in a very short period. Thirdly, the teacher's evaluations focus primarily on correcting the structural aspects of the written texts, specific word choices, grammar and sentence patterns. As a result, the improvement in students' writing accuracy was not significant. Additionally, due to the absence of face-to-face feedback sessions, teachers could not provide consistent explanations for the common mistakes in students' compositions.

4.2 *The Second Round of Action Research*

4.2.1 Identifying Problems

Firstly, the writing tests revealed that the students' basic knowledge needed to be improved, resulting in some students with poor English writing skills, struggling to keep up with the pace of classroom instruction. Consequently, in the subsequent action research cycle, it is crucial for the teacher to promptly offer scaffolding support to these students, aiming to motivate them and instill confidence in their writing abilities. Secondly, the students exhibited reduced motivation while utilizing input materials. Hence, the teacher should guide the students in creating brainstorming diagrams, enabling them to think more critically and clarify their thoughts processes. Thirdly, the teacher should adjust the assessment criteria, enabling the students to quantitatively measure their content, structure, and language. This could enhance the teacher's ability to closely track the learning process and evaluate the effectiveness of the students' learning. The point above is of utmost importance in the second round of action research.

4.2.2 Adjusting the Action Plan

The second round of action research was carried out to solve the problems found in the first round. This subsequent round entailed an increased number of class hours and a systematic selection of enabling activities, progressing from simple to complex, to cater to the students with varying levels of English proficiency. Then, the enabling activities should be diversified, and the teaching plan should be improved. Moreover, a lot of feedback and constructive suggestions should be given. The theme of “A wellness book” was taught in the second round of action research.

The discussion focused on students’ practical experiences transitioning to senior high school, allowing them to express their challenges and uncertainties. To address the issues identified during the first round of action research, POA was implemented in writing instruction, aiming to enhance students’ writing and critical thinking. The subsequent round of action research spanned three weeks and utilized unit 3, Sports and Fitness, from the first mandatory English textbook as the teaching material.

The first stage (week 1): The primary purpose of the first stage was to summarize the problems occurred in the first round of action research. The teacher adjusted the plan for the second round of action research according to the existing issues, and the students mastered the narrative writing method at this stage.

The second stage (week 2): The output task of the second round was “a wellness book”. The first essential part of POA was motivating, which was used to present the situation and arouse students’ writing interests. After motivating, the students tried to complete the first draft of the wellness book. The motivation problems in the second round were similar to those in the first round of action research. However, in the second round of action research, the students focused on the accuracy of their expressions. The students also learned some input materials about the topic.

The third stage (week 3): The teacher designed the enabling activities to help the students correct their errors in the writing, and the teacher should collect the second drafts to give feedback and to do the self-evaluation and peer evaluation.

The teaching objectives are as follows:

The objectives of language:

- (1) The students should master the expressions of physical and mental health and the changes before and after physical health, such as anxiety, being worried about, keeping a positive attitude towards sb/sth, being optimistic about, being happy about, and caring about.
- (2) The students should accumulate expressions of physical and mental problems, such as procrastination, anxiety, etc.
- (3) The students should master the past-time expression, such as a year ago, and master the expression of past practices, such as used to, and distinguishing used to from was used to.

The objectives of critical thinking skills

Students’ logical thinking ability should be trained, and the structure can be reasonably arranged in the writing process by revealing students’ reflections on their studies and lives and putting forward targeted improvement measures for students’ specific measures to build a healthy and correct aesthetic.

4.2.3 Summary of the Major Problems

After implementing the action plan, there were still some problems found in the second round of action research. First, the class size was too large to realistically provide individualized writing guidance. Second, during the composition guidance process, too much emphasis was placed on grammar and complex sentence structures, resulting in a lack of substantial content in the writing and minimal improvement in writing fluency. Third, the teacher focused only on developing students’ critical thinking skills, resulting in minimal improvement in composition structure and a fast-paced learning environment that created significant pressure for students with weaker foundations. Fourth, the students with higher proficiency level tended to utilize complex sentence patterns, but their grammatical accuracy needed improvement.

4.3 The Third Round of Action Research

4.3.1 Identifying Problems

The results of the second round of action research showed that there were still some problems existed, and the teaching plan for this action research should be adjusted to address these problems.

Firstly, it is not challenging to guarantee the effectiveness of teacher evaluation in time. Due to the large class size, teachers could not evaluate students' writing individually in a short time. Secondly, some students even needed to remember their writing ideas, which weakened the effectiveness of the teacher's evaluation to a certain extent.

4.3.2 Re-adjusting the Action Plan

After two rounds of action research, the students were more familiar with the teaching process with POA. According to the problems encountered in the second round of action research, in the third round of action research, teachers' evaluation should pay more attention to the content and structure of the writing, provide timely feedback, create a relaxed and democratic learning atmosphere, and help students establish confidence in writing. The topic for the third round was Unit 5, Languages Around the World, which was also from the first compulsory book.

The first stage (week 1): The primary purpose of the first stage was to summarize the problems existing in the second round of action research and adjust the plan for the third round. In this stage, the students should master how to write a blog.

The second stage (week 2): The topic of the third round of action research was English learning problems. The first step was to arouse students' interest in writing so they could write blogs on different topics. After being motivated, the students should try to complete the first drafts of the English learning problems. In the third round of action research, writing compositions not only required a few grammatical mistakes but also paid more attention to improving content and structure.

The third stage (week 3): The teacher designed the enabling activities based on the problems in the first drafts. In the process of teachers and students evaluating together, the teachers should carefully analyze the content and structure of the model writing so that the students can better use and internalize some advantages of the model writing.

By completing the composition with the theme of "English learning", on the one hand, the students should accurately describe the problems encountered in English learning and actively seek solutions by completing composition of English learning to learn the blog style and improve their written output ability. On the other hand, the students can reflect on their English learning methods and adjust their learning strategies to increase their understanding ability. The specific teaching objectives are as follows:

The objectives of language:

- (1) The students master the relevant vocabulary and phrases of English learning problems in the text, such as gap, demand, equal, vocabulary, native, I am having much trouble with...; My biggest headache is...; That is hard; For me, ...is my biggest problem; I do not know how to ...; I have no idea how/what...; I cannot etc.
- (2) The students can write their views on English learning problems and solutions through a blog.
- (3) The objective of critical thinking skills
- (4) The students can learn the advantages and disadvantages of online teaching and apply helpful information from online.

4.3.3 Summary of the Major Problems

After implementing the action plan, the teaching plan was adjusted in the third round of action research, and some improvements were observed, but some problems still needed to be resolved.

Firstly, teachers were still dominant in the whole teaching process. Due to the lack of teaching experience, implementing the teaching plan is more mechanical. Therefore, to maximize the effects of POA, the comfort zone should be removed, the ability to set up and implement teaching activities should be improved, and coordination between the teacher and the students should be genuinely achieved.

Secondly, although POA improved students' interest in writing and teachers' sense of teaching self-efficacy, a supporting curriculum system was still needed to fully realize the effects of this approach.

5. Results and Discussion

5.1 The Effects of POA on Senior High School Students' English Writing

This part presents the effects of POA on senior high school students' English writing. It included the effects on language, content, and structure of writing.

5.1.1 The Effects of POA on Language

Language of writing has three aspects to measure: complexity, accuracy, and fluency. Complexity has two aspects: syntactic complexity and lexical complexity.

(1) The Effects of POA on Complexity

A. The effects of POA on syntactic complexity

Table 3. Comparison of Syntactic Complexity between the Pre-test and the Post-test

	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2 tailed)
	M	SD	M	SD			
C/T	2.45	1.34	2.90	0.38	-0.45	-3.12	0.028
DC/C	0.30	0.17	0.44	0.33	-0.13	-3.12	0.010

*p<0.05

C/T=The total number of clauses divided by the total number of T-units.

DC/C=The number of dependent clauses divided by the number of sentences.

According to the findings in Table 3, there was a significant difference between the pre-test and the post-test results regarding C/T and DC/C ($t=-3.12$, $p<0.05$). These results align with the research of Wen (2015), who highlighted that the use of POA can assist students in selecting relevant ideas, language, and discourse structures from the input materials. This, in turn, aids in processing, practicing, and memorizing them. Consequently, students' writing complexity can benefit from the teaching process of enabling. In a similar vein, Wang (2021) conducted a teaching experiment comparing the use of POA and traditional teaching methods in two parallel classes. The results demonstrated an improvement in complexity among the students in the POA class. This improvement can be attributed to the enabling activities in the writing classes, where the students in the POA class could accumulate a broader range of advanced vocabulary, expressions, and complex sentence structures. Thus, it can be concluded that POA has the potential to enhance students' syntactic complexity.

B. The Effect of POA on Lexical Sophistication

Table 4. Comparison of Lexical Complexity between the Pre-test and the Post-test

	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2 tailed)
	M	SD	M	SD			
LS1	0.22	0.07	0.48	0.08	-0.26	-4.24	0.070
LS2	0.20	0.04	0.59	0.10	-0.39	0.00	0.057
LD	0.50	0.04	0.63	0.20	-0.13	0.04	0.038
NDW	62.33	11.38	90.22	0.10	-27.89	-6.87	0.000
TTR	0.58	0.06	0.69	0.10	-0.11	0.03	0.034

*p<0.05

LS1 =Lexical sophistication I LS =Lexical sophistication II

LD =The proportion of the lexical words to the total number of words in writing

NDW=The number of different words

TTR=The ratio of the number of word types to the number of words

Table 4 represents Sig. LD, NDW, and TTR values were lower than 0.05, indicating significant differences between the pre-test and the post-test. Moreover, no noticeable difference was shown in the lexical sophistication. It is testified that POA could enhance the linguistic variation and lexical density of English writing in senior high school. Table 4 shows that the average value of LS1, LS2, LD, NDW, and TTR improved in the third round of action research. After three rounds of action research, the students accumulated many lexical words in the

writings.

There are several factors contributing to the improvement of students' lexical density. Firstly, the teacher considers the students' zone of proximal development to ensure their engagement in motivating tasks and materials. This involves selecting materials that are appropriate for students' levels and interests. Secondly, in the enabling task, the teacher incorporates real-life situations to encourage active participation and enhance the application of knowledge gained in class. Moreover, the teacher dedicates ample time to evaluate both students and teachers. Through providing feedback on outstanding work and facilitating peer evaluation, the students can learn from their peers' expressions and gain inspiration for their writing. Lastly, the teacher guides the students to pay attention to language, content, and structure during the revision process of the students' compositions.

(2) The Effects of POA on Accuracy

Accuracy is the extent to which the target language is produced according to its rule system. In contrast, inaccuracy could impair communicative effectiveness or result in the fossilization of language output competence. (Skehan, 1996). EFT/T is selected to measure the accuracy of English writing.

Table 5. Comparison of Accuracy between the Pre-test and the Post-test

	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2 tailed)
	M	SD	M	SD			
EFT/T	0.63	0.12	0.95	0.20	-0.32	-0.20	0.028

*p<0.05

EFT/T=Number of error-free T-units divided by the total number of T-units

The conclusion could be drawn in Table 5 that the Sig. Values of EFT/T were lower than 0.05, indicating a significant difference between the pre-test and the post-test. The mean of the accuracy was boosted in the post-test.

The results of this study were similar to those of Chen and Li (2009). They found that the evaluation and feedback given after writing can improve the accuracy of learners' expressions. In the teaching process, the teacher-students collaborative assessment was adopted in the POA class, which was the most important reason for improving the accuracy of students' writing. Wang (2021) also proved that the writing accuracy of senior high school students significantly improved after applying POA.

In general, through the cooperative evaluation between teachers and students, students were conscious of the importance of writing accuracy. They could avoid some low-level grammar and vocabulary mistakes in their writing process. Therefore, after the eight weeks' teaching practice, students' writing accuracy in the POA class was improved.

(3) The Effects of POA on Fluency

Table 6. Comparison of Fluency between the Pre-test and the Post-test

	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2 tailed)
	M	SD	M	SD			
W/T	8.59	2.42	12.90	1.80	-0.32	-0.20	0.028

*p<0.05

W/T=Total number of words per T-unit

As shown in Table 6, there was a significant difference between the pre-test and the post-test. (p<0.05). The mean fluency score improved after three rounds of AR. This result was consistent with that of Wang (2022), who found that POA could enhance the fluency of writing. To ensure fluency in language output, the language chunks should be accessed in learners' long-term memory, which frequent language output exercises could facilitate. This result was inconsistent with Wang (2021), who demonstrated that the improvement of fluency took a long time and was affected by the conception mode and writing concerns. Swain (1995) claimed that if learners can use their newly learned words through various tasks, they will likely be inherited in learners' freely produced vocabulary. The more opportunities students had to practice these new words, the more likely they were to absorb and use them freely.

At the beginning of the experiment, the teacher carried out motivating activities, selected materials, and activities related to the units, and constantly stimulated students' curiosity. The teacher summarized the problems that the

students encountered in the motivating task in writing and promoted the activities individually to let the students know their problems. During the writing process, the students could continuously improve their composition and accumulate experience so that their composition scores increased.

5.1.2 The Effects of POA on Content

To understand the specific impacts of POA on students' writing content in more detail, the scores of students' writings were analyzed by experienced English teachers in senior high school. Finally, the content comparison between the pre-test and the post-test was analyzed.

Table 7. Comparison of Content between the Pre-test and the Post-test

Content	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2 tailed)
	M	SD	M	SD			
	6.86	1.33	7.50	2.80	-0.64	-4.03	0.028

*p<0.05

Table 7 demonstrated that there was a significant difference between the pre-test and the post-test ($t(39) = -4.03$, $p < 0.05$). This meant that the writing content was improved by applying POA. Through motivating, the students could achieve better learning outcomes if teachers were willing to provide appropriate input materials at the right time (Wen, 2015). The students can perceive and learn various language expressions by reading materials related to the topic. The students learned how to expand their thinking and enriched their content through step-by-step activities (Wen, 2015). The students can learn what can be written on a specific topic through different enabling materials. The students' essays can also prove the improvement of students' writing content. After the application of POA, the students had an improved understanding of the writing tasks, and they could also write more detailed information as a supplement to their opinions. Moreover, they could use a variety of rich vocabulary to express their ideas.

Considering all the results of the above paired sample t-tests into consideration, it is evident that the POA was effective in improving students' writing content. The improvement of students' writing content can also be observed when comparing the pre-test and posttest of the students' writing essays.

Excerpt 1(pre-test): Student (3)

Dear Jim

Hello, Jim. My name is Li Hua. I am a student in Xing Guang senior high school to welcome you. our classmates are very happy that you welcome. our teacher is very kind and welcome to you! you are going to join us. we are going to holding a welcome party! our school have all kinds of clubs. It is able to develop your interest.

Finally, welcome to you!

Yours sincerely,

Excerpt 2 (post-test): Student (3)

Dear Jack

I am deeply sorry to hear that you did not do well in your recent English midterm exam. Today, I am writing to encourage you and share my experience in learning.

To begin with, I suggest that you prepare in advance and it is full preparation that enables one to gain nice scores in tests. A case in point is myself. Compared with others, I am not smarter, but adequate preparation brings me confidence, arouses my passion for learning and helps me succeed. In addition, you are supposed to consult your professors about methods of learning, which will help to improve your grades.

Yours sincerely,

As can be seen clearly from Excerpt 1 in the pre-test, the student's suggestions were simple and even did not meet the requirements in the writing instruction, let alone some relevant or developed ideas of the writing topic. Besides, most sentences in pre-test were subject-verb-object structure and there were some mistakes in collocation, such as "we are going to holding a welcome party". Some misusing of language even impedes understanding, like the first underlined sentence: "I am a student in Xing Guang high school to welcome you". While in the post-test, there was a richer content, not only the required in the writing instruction, but also some extended content. For example, the underlined sentence "I am writing to encourage you and share my experience in learning" is the reason for writing the letter. What's more, the student used a long and complicated sentence to

give advice which also met the demand of the writing instruction. “I suggest that you prepare in advance and it is full preparation that enables one to gain nice scores in tests”. In the pre-test, the sentence structures were almost the same. the word “welcome” appears five times in one article which causes repetition. The simple sentence structures like “we are happy that...” “we are going to...”, were frequently used rather than clauses. While in the post-test writing, there were rich vocabularies such as “consult”, “enable” and “arouse” to describe the methods; “at begin with”, “compared with” to make the passage more coherent. Meanwhile, attributive clauses (which-clause) and subjunctive are used as well. In summary, through the data analysis of writing scores and the comparison of students’ compositions, POA can improve students’ writing content. The result is consistent with those of the previous studies (Zhang, 2017). POA broke the boundary between learning and using, providing sufficient input and appropriate productive activities for students. Students can learn selectively to make preparation for their output tasks in the process of learning.

5.1.3 The Effects of the Production-Oriented Approach on Structure

In terms of writing structure, article cohesion, and context logic, the students can use many connectives to make the article layout beautiful and reasonable. The structure of pre-test and the post-test was compared, and the results were illustrated in the following table.

Table 8. Comparison of Structure between the Pre-test and the Post-test

Structure	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2 tailed)
	M	SD	M	SD			
	2.35	0.75	4.00	0.42	-1.65	3.15	0.627

*p<0.05

According to Table 8, the mean value of the structure increased after three rounds of POA. However, there was no significant difference between the structure of pre-test and the post-test ($p>0.05$). Because, on the one hand, in the process of writing, the students paid too much attention to vocabulary, grammar and complex sentence patterns, ignoring the structure of the composition. On the other hand, in the process of writing, the structure of the model compositions was presented clearly and analyzed thoroughly, so from the very beginning, the students had no big problems in terms of the structure of the composition.

5.1.4 The Effects of the Production-Oriented Approach on Structure

In terms of writing structure, article cohesion, and context logic, the students can use many connectives to make the article layout beautiful and reasonable. The structure of pre-test and the post-test was compared, and the results were illustrated in the following table.

Table 9. Comparison of Structure between the Pre-test and the Post-test

Structure	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2 tailed)
	M	SD	M	SD			
	2.35	0.75	4.00	0.42	-1.65	3.15	0.627

*p<0.05

According to Table 9, there was no significant difference between the pre-test and the post-test ($p>0.05$). The mean value of the structure increased after three rounds of POA. This result was discordant with previous research (Wu, 2021), which certified that POA improved the cohesiveness of writing. The structure was fixed, so the students were familiar with writing a well-organized composition but could not flexibly apply the joint structures.

5.2 The Effects of POA on Senior High School Students’ CTSs

The second question to be answered in this research is the effects of POA on high school students’ CTSs. To determine whether POA can advance CTSs, the pre-questionnaire and post-questionnaire were compared. The overall effects and eight-dimensional effects of POA were introduced.

5.2.1 The Overall Effects of POA on Senior High School Students’ CTSs

What is well known is that students’ CTSs and logical ability cannot be improved quickly, which also shows that the current situation of English teaching in middle school in China ignores the cultivation of students’ CTSs. The pre-test and post-test scores are put into SPSS 27.0 using paired sample t-tests shown in Table 10.

Table 10. Comparison of CTS between the Pre-test and the Post-test

Critical thinking skills	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2 tailed)
	M	SD	M	SD			
	225.52	2.80	230.52	2.08	-5.00	3.15	0.004

*p<0.05

Table 10 showed a significant difference in CTSs between the pre-test and the post-test ($p<0.05$). However, after the teaching experiments, the mean values increased. Therefore, it could be proved that POA can improve the critical thinking of students as a whole. The reason is that the key capability theory concept of the POA lists the cultivation of CTSs. This result was consistent with Li (2022), who proved that each dimension was enhanced by applying POA. The teaching goal is to cultivate students' critical awareness, pay attention to teaching language knowledge and language structure, and cultivate students' humanistic spirit.

5.2.2 The Effects of POA on Dimensions of Senior High School Students' CTSs

The critical thinking tendency questionnaire divided the questions into analysis, curiosity, self-confidence, truth-seeking, cognitive maturity, open-mindedness, justice, and tenacity. To test whether POA can boost which aspects of CTSs, the paired sample t-test of each dimension was done. The result was presented in Table 11.

Table 11. Comparison of the Dimensions of CTSs between the Pre-test and the Post-test

Dimensions	Pre-test (n=40)		Post-test (n=40)		MD	t (39)	Sig (2-tailed)
	M	SD	M	SD			
Analysis	27.33	2.01	28.52	3.40	-1.19	-2.57	0.003
Curiosity	27.98	2.45	28.50	2.03	-0.52	-2.57	0.035
Tenacity	25.60	3.12	26.17	2.40	-0.57	-2.57	0.047
Self-confidence	31.20	3.40	31.27	2.76	-0.07	-2.57	0.208
Truth-seeking	29.48	2.40	30.60	2.40	-1.12	-2.57	0.356
Cognitive-maturity	33.83	2.91	34.12	1.82	-0.29	-2.57	0.035
Open-mindedness	26.50	2.58	27.34	3.52	-0.84	-2.57	0.039
Justice	23.60	1.44	24.0	2.40	-0.4	-2.57	0.018

*p<0.05

The conclusion could be drawn in Table 11 that the mean of analysis, curiosity, tenacity, cognitive maturity, open-mindedness, and justice increased in the post-test. The Sig values were less than 0.05. It was presented that there were significant differences between the pre-test and the post-test after three rounds of action research.

POA can enhance these aspects of CTSs. It can be proved that in Zhang's (2022) study, there were differences in these dimensions. After more than two months of study, the students' learning interests have greatly improved. Group cooperation, discussion, and evaluation expanded their CTSs. Li's study (2022) showed that the mean values of each dimension of CTSs improved. In Li's study (2022) interview, the questions and activities of enabling links were novel, so the students struggled to find the answers, constantly improving their analytical reasoning ability and expanding their horizons. They need to have a more comprehensive understanding, constantly accept different points of view, and solve some things critically.

In conclusion, the paired samples t-tests were carried out between the pre-test and the post-test to answer if POA had effects on language, content, and structure. The results showed that POA positively affected the language and content of English writing. Besides, the paired sample t-test was done between the pre-and post-questionnaires to test if POA can affect the CTSs of senior high school students. POA can enhance CTSs in general and has different impacts on different dimensions.

6. Conclusion

6.1 Major Findings

This study aims to explore whether POA affects the language, content, and structure of English writing and CTSs of senior high school students. The main findings of the study are summarized below.

Firstly, POA can improve senior high school students' English writing performance, which is mainly manifested in three aspects: language, content, and structure. In the paired samples of the pre-test and the post-test, POA had positive effects on syntactic complexity, lexical diversity, lexical variation, accuracy, fluency, and writing content. However, it could not significantly improve the structure of English writing.

Secondly, POA can promote the CTSs of senior high school students. POA can promote six dimensions of students' critical thinking skills, including analysis, tenacity, curiosity, cognitive maturity, open-mindedness, and justice, but self-confidence and truth-seeking showed no significant differences between pre-and post-questionnaires.

6.2 Implications for Improving Senior High School Students' English Writing and CTSs

Based on this study's significant findings and relevant literature about applying POA in English writing, some suggestions are made to improve senior high school students' English writing performance and CTSs.

6.2.1 Implication for Improving English Writing

Firstly, in motivating, teachers should serve as designers who design communicative scenarios to attract students' interest in the class. During the enabling stage, teachers should selectively focus on practicing essential vocabulary and sentence patterns to ensure students can effectively apply the language they have learned in their output. Enabling helps students complete writing tasks and contributes to developing their language proficiency, emotional intelligence, and CTSs. In the assessing phase, teachers should encourage and guide students to objectively evaluate their compositions or their peer's compositions based on the assessment criteria, and the teacher should provide timely feedback.

Secondly, the teacher who carried out action research could only teach online classes with only 40 students because of COVID-19. The teacher cannot observe students' reactions online in class, and the teacher cannot give timely feedback. Therefore, researchers should combine online teaching and offline teaching in the future to apply POA in writing teaching, and increase the number of the sample size to enhance generalizability.

Thirdly, teachers should understand the differences between students, having a basic understanding of their age characteristics, living environment, and English level so that teachers have different ways to deal with the problems the different students encounter in production.

6.2.2 Implication for Improving CTSs

Firstly, teachers should apply POA to teach English writing in senior high school. In motivating, the teacher should present the motivating materials and questions that make learners aware of their knowledge gaps to improve their curiosity and truth-seeking. In the process of enabling, teachers should provide the learners with a large amount of information through diversified classroom activities and promote their language and viewpoints to help them complete their output tasks to enhance learners' analysis, open-mindedness, truth-seeking, and self-confidence. In assessing, teachers should allow students to discuss the feasibility of viewpoints in peer writing.

Secondly, teachers should design challenging and speculative argumentative essays based on POA. Argumentative writing is better than narrative and practical writing in cultivating the students' CTSs, which is one of the core qualities of English in senior high school. Therefore, teachers should not just stick to the scope of the college entrance examination but take the core qualities of the subject as the guide, design challenging and critical topics for argumentative essays, and help senior high school English learners develop CTSs.

6.3 Limitations of the Study and Suggestions for the Future Research

The present study explores the effects of POA on writing and critical thinking skills by carrying out three rounds of action research. However, there are still some limitations in this action research, which can be summarized as follows.

Firstly, students need to spend more time doing action research to get adequate writing training. Therefore, the following researchers are supposed to spend more time and arrange the time reasonably to maximize the teaching effect of POA.

Secondly, the teacher who carried out action research could only teach online classes because of COVID-19. The

teacher cannot observe students' reactions online in class, and the teacher cannot give timely feedback. Therefore, researchers should combine online teaching and offline teaching in the future to apply POA in writing teaching.

Thirdly, the present study adopted a quantitative research design, and the questionnaire had fewer participants, so the research could have been more extensive. Therefore, the number of research participants should be expanded to more classes and even more senior high schools. An in-depth interview was conducted to explore the effects of POA on writing performance and critical thinking skills.

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