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Effects of cooperative translation on Chinese EFL student levels of interest and self-efficacy in specialized English translation

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Translation instruction is very important in specialized English teaching activities. The effectiveness of current specialized English translation instruction (SETI) in mainland China, however, is unclear because university students have become less interested in, and less confident when doing, English translation. This study investigated the effects of online cooperative translation on EFL students' levels of interest and self-efficacy with respect to specialized English translation through a questionnaire, focus group interview, interaction data analysis, and pre-test and post-test on 48 second-year college students in China majoring in educational technology. The results showed that online cooperative translations could significantly increase student interest and self-efficacy in specialized English translation. In cooperative translation, student engagement was significantly and linearly correlated with their interest and self-efficacy in translation. We conclude with recommendations on reforming current SETI practices in mainland China's universities.

Keywords: cooperative learning; EFL; cooperative translation; self-efficacy; interest

Introduction

With the advancement of globalization, a large number of highly qualified, talented individuals with specialized English competencies are needed urgently in China. Specialized English is a basic required course for most majors in the universities of China (Zhang & Li, 2010). The objective of specialized English teaching is to cultivate versatile, talented individuals who can consult and process information in English related to their majors (Ding, 2012). Currently in Chinese universities, specialized English teaching still follows the traditional “grammar-translation” method, in which teachers play a central role while students accept instructions passively, resulting in a less dynamic classroom atmosphere. For developing specialized English talents more effectively, many scholars explored reforming specialized English teaching models (Kang & Wang, 2003; Qin & Wang, 2011; Tao, 2008) and teaching philosophy (Ding, 2012; Wang, 2013).

Listening, speaking, reading, and writing are the four basic skills of foreign language learning (Carroll, 1967). Translation competence requires, at least, reading and writing skills in two different languages and the ability to combine and coordinate these skills (Dragsted, 2010). Translation can help EFL students acquire both linguistic knowledge and language skills (Liao, 2006). Therefore, translation instruction is very important in specialized English teaching (Ma, 2011). The primary materials used in specialized English translation are reading materials related to the students' respective majors. Specialized English translation instruction (SETI) aims to cultivate student competencies in translating content from particular professional fields, such as chemistry, biology, and

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business administration. However, the effectiveness of SETI is now being questioned because university students become less interested and less confident in this course (Liang & Li, 2011; Sun & Bai, 2011).

This study aims to examine whether the cooperative translation instruction based on the cooperative learning system (Yu, Yang, Cheng, & Wang, *in press*) can improve university student interest and self-efficacy in specialized English translation. Interest allows for correct and complete recognition of an object, leads to meaningful learning, promotes long-term storage of knowledge, and provides motivation for further learning (Schiefele, 1991). Self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments (Bandura, 1977), and can contribute to cognitive development and functioning (Bandura, 1993).

The two research questions are specified as follows: (1) Can online cooperative translation improve student interest and self-efficacy in specialized English translation? (2) Does engagement (measured with times of interactions) correlate to interest and self-efficacy toward specialized translation as well as translation test results do?

Literature

Specialized English translation instruction

Much research has been conducted to improve SETI and enhance teaching quality. The following is a brief literature review of recent work on SETI for EFL learners in China and abroad.

Researchers in China have mainly focused on translation techniques and strategies. College students often make mistakes while translating long sentences and the passive voice (Liao, 2010). The general translation techniques include word-for-word translation, transliteration, and paraphrasing (Li & Shi, 2009). Some scholars (Wang & Guo, 2010; Yuan, 2010; Zhang & Mei, 2011) explored further more concrete strategies using in translating attributive clauses and inverted sentences. With the proliferation of information technology, computer-assisted language instruction is becoming a new trend. More and more studies (Bu, 2009; Jiang, 2014; Tong, 2013; Zhang, 2012) were conducted to explore the integration of information technologies and SETI. Information technology could bring more multimedia teaching resources and flexible interactions between students and teachers. The appropriate use of information technologies could effectively improve student performance of specialized English translation (Bu, 2009; Lv, 2010).

Many scholars outside China adopted a standard empirical research model for their SETI research, covering specialized English translation tests, learning motivation, common mistakes, and cultural factors. With respect to the test of specialized translation competence, the open-ended test performed better than the multiple-choice test (Ahmadi, 2011). Students need to make more mental effort to finish the open-ended test, so it can reduce the possibility of randomly selecting answers while doing multiple-choice tests. In some situations, the memorization strategies could be helpful for enhancing language skills, such as vocabulary learning and grammar learning (Nemati, 2009). However, the memorization strategies did not significantly improve the specialized English translation competence of students (Lo, 2013). Well-designed translation tasks are important for obtaining good results in SETI. Research findings showed that flow experience (Kiyoshi, 2004; Nakamura & Csikszentmihalyi, 2009) emerging from well-designed translation tasks would significantly enhance the intrinsic motivation and overall level of English learning in EFL students (Guan, 2013). Word order, structural issues, and inappropriate

vocabulary choice were the most common mistakes during specialized English translation (Sadeghi, 2011). Therefore, students should strengthen training in the abovementioned aspects. In addition, culture is also an important factor in specialized English translation. Culture belongs to a kind of context, and contexts can promote language learning (Breen, 1985). Mahrooqi's (2013) study revealed that culture familiarity is an important factor that can facilitate reading comprehension in Arab English translation. Actually, besides the culture familiarity, both cultural knowledge and cultural awareness are also important for specialized English translation.

Above all, recent SETI research has ignored the development of student interests and self-efficacies in specialized translation. Einstein once said, "Interest is the best teacher". Self-efficacy determines the courses of action people choose to pursue, how much effort they put into given endeavors, how long they will persevere in the face of obstacles and failures, and the level of accomplishments they realize (Bandura, 1982). Therefore, the development of student interest and self-efficacy should be stressed in SETI.

Cooperative learning in specialized English teaching

In recent years, cooperative learning has become increasingly popular (Gillies & Ashman, 2013; Krause et al., 2009). Cooperative learning can have powerful effects when properly implemented. There is a rich theoretical base for cooperative learning (Slavin, 1980), and positive interdependence, individual accountability, promotive interaction, social skills, and group processing are five basic elements for successful cooperative learning (Johnson et al., 1998). In cooperative learning, students can blend individual and collective efforts to finish more challenging tasks, develop social skills and responsibilities. So far, many studies conducted in various contexts have proved that cooperative learning was beneficial for improving learner achievements, attitudes, and motivation (Aydin, 2011; Nam, 2014; Nam & Zellner, 2011; Topping et al., 2011; Yang et al., 2013; Zraa et al., 2013).

Accordingly, many language teaching researchers began to explore how to use the cooperative learning method to improve the result of second language learning. At present, studies of cooperative language teaching and learning mainly focused on the areas of reading comprehension, writing, oral skills, and motivation toward learning.

In the classroom context, teachers could create a dynamic classroom atmosphere and motivate students through carrying out activities such as group discussion, classroom debate, and exercises (Zhao, 2012). An interactive writing teaching method based on cooperative learning theory proposed by Li (2010) had been shown to rapidly improve students' English writing skills. By peer assessment, peer editing, and experience sharing, students could find their defects in writing and learn more writing strategies from partners. Regarding specialized English reading, cooperative learning can play a more effective role. Many studies proved that cooperative reading was able to enhance students' reading comprehension achievements and reading levels (Chang & Hsu, 2011; Ghaith & El-Malak, 2004; Pan & Wu, 2013; Wood, 1992; Yang et al., 2013). Moreover, the effect was more highlighted for medium- and low-proficiency students. That is because compared with the high-proficiency students, the medium- and low-proficiency students were more needed to get success through collaborations. Additionally, cooperative learning could create a significantly positive effect on student oral skills and motivations toward English learning (AbuSeileek, 2007; Zahedi, 2012).

In addition to the abovementioned aspects, cooperative learning is also very helpful in enhancing specialized English translation capability. Cooperative translation could result

in deeper processing of both pragmalinguistic and sociopragmatic knowledge, leading to more appropriate pragmatic production (Kargar et al., 2012). In the computer-supported cooperative environment, the number of students in each group should not exceed five; otherwise, it may be difficult to achieve good results (Chang & Hsu, 2011). Cooperative learning also had good effect on college students' attitudes toward specialized English translation and translation quality. Meng's (2010) study found that college students welcome the use of cooperative learning in SETI, and the method could significantly improve students' translation performance.

In summary, most of the current SETI cooperative learning research has been carried out in non-Web-based environments, with only a few conducted in Web environments (Chang & Hsu, 2011). In addition, current SETI research stresses intra-group cooperation while neglecting inter-group cooperative learning and whole class cooperation. Web environments facilitate the sharing of rich resources and are highly interactive. Online cooperative learning has a positive effect on reading comprehension, translation results, and motivation towards learning. However, it is still unclear whether it also has a positive effect on student interest and self-efficacy in specialized English translation, as well as whether student engagement is correlated with interest in translation, self-efficacy, and translation results in cooperative learning. Further empirical research is needed to answer these questions.

Methodology

Participants

The participants were 48 university students majoring in educational technology at Jiangsu Normal University (12 males and 36 females, with an average age of 20.6). They were divided into 12 groups of 4 students each. Each student had a laptop computer and was very familiar with information technologies; they had an average of 1.5 years of experience with online learning. The participants were fluent in English, with 35 (72.9%) having passed the National College English Test, Band 4. Before enrolling in the specialized English course for educational technology, all participants had completed a public English course offered to all students from various majors. The participants learned basic translation knowledge and skills from the public English course.

Instruments

This study adopted a single-sample experimental design using the following tools: perception questionnaires (interest and self-efficacy), specialized English translation competence tests (pre-test and post-test), and focus group interviews.

Perception questionnaires

The perception questionnaires were created to examine the participants' perceptions with respect to specialized English translation of educational technology. In total, the perception questionnaires included 12 statements divided into two categories: "degree of interest" and "perceived self-efficacy". Each category included six questions. A five-point Likert-type scale was employed to measure participant perceptions. For example, for the item "I found the specialized English translation of educational technology very difficult", the possible responses were "strongly agree", "agree", "neutral", "disagree", and "strongly disagree".

The perceived self-efficacy questionnaire was adopted from Wang and Hwang (2012), with a revised Cronbach's $\alpha = 0.84$. Wang and Huang's self-efficacy questionnaire included eight questions. Questions 1 and 7 were used to measure students' confidence with respect to getting good grades. Questions 4 and 5 were used for measuring students' confidence with respect to mastering the learning content. Therefore, we combined the above two sets of questions. As a result, this study included six perceived self-efficacy questions.

The interest questionnaire was prepared by the researchers (Cronbach's $\alpha = 0.86$). The questionnaire included six questions to survey students' interest with respect to specialized English translation, including initiative, willing, expectations, etc. The internal consistency of the whole perception questionnaires was high (Cronbach's $\alpha = 0.89$). Generally, the Cronbach's $\alpha \geq 0.70$ is the typically recommended standard, representing the availability of a questionnaire (Bland & Altman, 1997; Krank et al., 2011). Therefore, the reliabilities of the perception questionnaires were found to be good and acceptable.

Pre-test and post-test

The pre-test and post-test were conducted in class to assess participant competencies of specialized English translation both before and after the cooperative translation activity.

Before the start of the current study, the course instructor assigned a task of specialized English translation of medium difficulty. According to the course syllabus, a translation article of medium difficulty should contain 15 to 20 specialized vocabulary words in every 100 words of text (Jiao & Ye, 2005). The teacher prepared a short article of 200 words with 32 specialized vocabulary words. The students translated it independently (English to Chinese translation) within 20 minutes. The total possible score of this test was 60. The results were assessed by two reviewers using the same criteria with over three years of experience teaching specialized English for Educational Technology. The inter-rater reliability was 0.83 ($p < 0.01$). The three main evaluation criteria were faithfulness, expressiveness, and elegance of translation. The scores were used as the pre-test results.

In addition, the researcher and course teacher jointly prepared a post-test specialized English translation task. The students' task results were also assessed by the same two reviewers to ensure its effectiveness and difficulty level (medium). There were five translation tasks (English to Chinese) with 452 words, including 78 specialized vocabulary words. The students were given 45 minutes to complete this post-test, and the total possible score was 60. The same two reviewers assessed the post-test results. The average scores of the two reviewers were used as the students' final achievement scores.

Focus group interviews

After the post-test, three of the groups were selected for focus group interviews. All interviews were recorded with a recording pen (Lenovo Group Limited, Beijing, China). Each group interview lasted about 20 minutes. Then the researcher transcribed the audio of each interview into text, which was then sent to each interviewee by email for revision and supplementation to ensure the accuracy and completeness of the text. Then, the researcher sorted all of the texts again to form the final interview text.

The interview outline included three items: (1) Please give a brief description of the process of your team's cooperative translation; (2) What did you get from this cooperative translation activity? (3) Were you satisfied with the Web-based cooperative translation activity? Do you have any suggestions for improvement of the process?

Procedure

The title of the experimental course was “Specialized English for Educational Technology”, and it lasted for four months from March to June 2013. The development of specialized translation interest and competence was one of the main objectives of the course. The course combined classroom instruction with Web-based learning.

The study lasted for three weeks, overlapping with part of the course duration. The entire cooperative process was carried out on the cooperative learning system. **Figure 1** outlines the research procedure.

- (1) Before carrying out the actual translation activities, we conducted a survey of the students’ interest and self-efficacy with respect to the translation of English for Educational Technology, and we tested their competence in specialized English translation.
- (2) The course instructor selected 12 articles of medium difficulty and posted them on the cooperative learning system, which randomly allocated them to 12 groups.
- (3) Each group appointed a team leader to organize and coordinate the translation tasks.
- (4) In the first week, each group carried out internal collaboration. The group leader was responsible for task allocation and supervision. After task allocation, members began to search for materials on the Internet, discuss in the discussion zone for issues from the translation, and translate paragraph by paragraph. When all

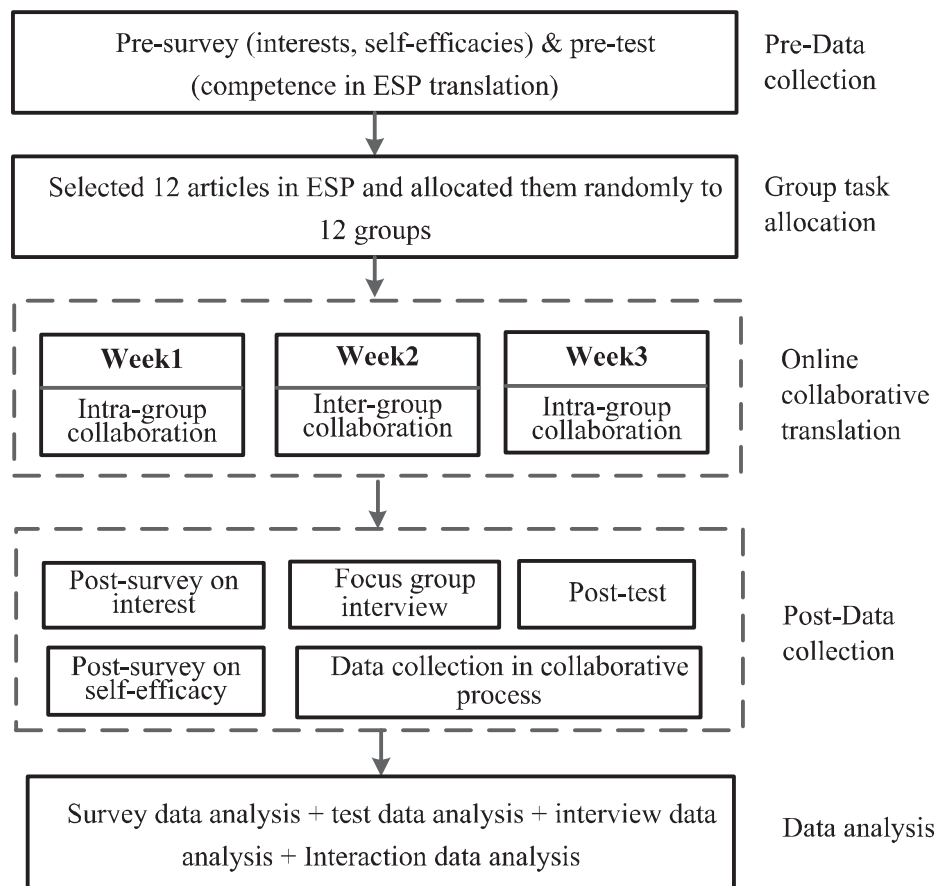


Figure 1. Research procedure.

the group members completed their task, they began to crosscheck each translation part. Then the first draft translation was formed.

- (5) In the second week, inter-group collaborations were conducted. Each group selected at least four other groups' translation works to comment and annotate. The group leaders could receive system notifications timely when their works were commented or annotated.
- (6) In the third week, each group carried out internal collaboration again. The group leader collected all the advices and organized an online discussion to determine the reasonable advices. Each member was assigned with some specific revision tasks. Through group discussion and collective revision, the final translation was formed.
- (7) Following the above activities, the students' interest and self-efficacy with respect to the translation of English for Educational Technology were re-tested.
- (8) All students then participated in a translation competency test of English for Educational Technology, and the abovementioned instructors assessed the resulting translations separately.
- (9) The average of the two scores produced by the instructors became the result for each student's competency in translation of specialized English.
- (10) Three groups were selected randomly for the focus group interviews.
- (11) Process data were collected from the cooperative learning system for the cooperative translation, including the number of previous versions of each translation, the number of cooperative interactions (comments, annotations, and posts) and the content of all student interactions.
- (12) SPSS 18.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis of the questionnaires, interviews, pre-tests and post-tests, and all the data collected from the platform.

Data analysis and results

Questionnaire data

The researchers carried out both a pre-survey and post-survey on the same sample. The objective of these surveys was to assess students' levels of interest and confidence with respect to specialized English translation both before and after they performed the cooperative translation tasks. The two surveys were conducted through a professional survey site.¹ For the pre-survey, 48 questionnaires were collected, with a valid response rate of 100%. As for the post-survey, 45 questionnaires were collected, with a recovery rate of 93.75%, and an effective rate of 100%.

We carried out independent *t*-tests on the interest and self-efficacy survey data. The results are shown in Table 1.

Table 1. Results of an independent sample *t*-test: interest and self-efficacy toward translation.

		<i>N</i>	Mean	SD	<i>t</i>	<i>p</i>
Interest	Post-survey	48	3.700	0.537	7.566***	0.000
	Pre-survey	45	2.825	0.576		
Self-efficacy	Post-survey	48	3.400	0.723	3.416**	0.001
	Pre-survey	45	2.958	0.494		

Note: ***p* < 0.01, ****p* < 0.001.

Table 2. Results of an independent sample *t*-test: translation competence test scores.

		<i>N</i>	Mean	SD	<i>t</i>	<i>p</i>
Translation competence	Post-test	48	48.31	7.515	3.258**	0.002
	Pre-test	48	43.71	6.277		

Note: ** $p < 0.01$.

The pre-survey results show that the average interests score was 2.825, indicating that in general students were not that interested in specialized English translation. The post-survey results show that the average score was 3.700, an increase of 0.875. Moreover, this difference in interest scores between the pre- and post-surveys was statistically significant.

The pre-survey results show that the average self-efficacy scores was 2.958, indicating that general students were not very confident in specialized English translation. The post-survey results, however, show that the average score was 3.4, an increase of 0.422. This difference between the pre- and post-activities was significant ($p = 0.001 < 0.01$).

Translation test data

To examine the effect of the study activities on translation competence in specialized English, we carried out an independent sample *t*-test on the results of pre-test and post-test (see Table 2).

Table 2 shows that the average post-test scores increased by 4.6 and that a very significant difference exists between the two groups of test scores ($p = 0.002 < 0.01$).

Student engagement data

To answer the second research question, we analyzed the correlations between student engagement and their levels of interest and self-efficacy, and their English test scores. Interactivity is one significant factor that predicts engagement in learning through virtual worlds (Choi & Baek, 2011). In this study, we represented behavioral engagement by measuring the number of student interactions. Specifically, the actions of posting or replying to a comment, making an annotation, posting or replying to a post, and editing a portion of a text were all treated as an interaction. Thus, a higher interaction number indicates higher engagement, and vice versa.

First, all interaction data for the cooperative translation tasks recorded by the cooperative learning system were exported to Excel, resulting in 738 individual records. Next, each record was reviewed manually to remove any spurious data, such as invalid comments, resulting in 667 valid records. The average number of interactions per student was 13.90 (SD = 8.46). Finally, correlation and linear regression analyses on engagement, interest, self-efficacy, and post-test scores were performed using SPSS version 18.0.

Table 3 shows the results of the correlation analysis for student engagement and interest in translation (post-survey), self-efficacy (post-survey), and the post-test scores. The standardized correlation coefficient $r = 0.361$ (*) between student engagement and interest in translation indicates that the two values are significantly correlated. Similarly, the standardized correlation coefficient $r = 0.378$ (*) between student engagement and self-efficacy also indicates that the two values are significantly correlated. However, the standardized correlation coefficient $r = 0.262$ between student engagement and post-test scores indicates that the two values are not significantly correlated.

Table 3. Results of correlation analysis.

		Interest	Self-efficacy	Post-test
Engagement	<i>r</i>	0.361*	0.378*	0.262
	<i>p</i>	0.015	0.010	0.072

Note: * $p < 0.05$.

To explain the effect of engagement on both interest and efficacy further, linear regression analysis was performed for each variable independently. The results show that there is a significant and linear correlation between engagement and interest, and engagement and self-efficacy: 2.4% of the interest can be explained by engagement ($r^2 = 0.13$, $p = 0.015 < 0.05$) and 3.3% of the self-efficacy can be explained by engagement ($r^2 = 0.14$, $p = 0.01 < 0.05$).

To examine whether a significant difference exists between the high-engagement and low-engagement students in terms of their post-test scores, we divided the students into a high-engagement team (the top 27% of students in terms of number of interactions) and a low-engagement team (the bottom 27% of students in terms of number of interactions); each group had 13 students. The independent sample *t*-test result (see Table 4) showed that the high-engagement team had an average score of 6.85 points higher than that of the low-engagement team; this difference was significant ($p = 0.041 < 0.05$).

Group interview data

To further investigate the effectiveness of the cooperative translation activities, we carried out focus group interviews with three groups of students (12 students in total) divided according to their degree of engagement (number of interactions): high (Group 1), middle (Group 2), and low (Group 3). Three researchers, one for each group, participated in the interviews. Detailed communication was carried out before the interviews to determine the appropriate interview method and strategies. The three group interviews were carried out simultaneously and lasted for 20 minutes.

Regarding the interview questions, Question 1 attempted to understand how the group carried out their cooperative translations. The cooperative process for the three groups was very similar, starting with the group leader allocating translation tasks. Each group member first completed a translation of his or her assigned paragraph, and then submitted recommendations for the revision of other paragraphs. For difficult sentences or words, the student responsible for the paragraph translation would post a query in the discussion zone to be discussed by the group members so that a consensus could be reached. Upon completion of the initial draft translation, it was published for further review by the

Table 4. Results of an independent sample *t*-test: high engagement and low engagement.

	Group	<i>N</i>	Mean	SD	<i>t</i>	<i>p</i>
Post-test	A	13	50.77	6.247	2.181*	0.041
	B	13	43.92	9.438		

Notes: * $p < 0.05$.

A: high-engagement group; B: low-engagement group.

members of the other groups, who could then post their own comments, annotations, or direct edits. Next, each group carried out internal discussions based on the feedback received from the other group members and decided whether to adopt or reject any suggestions. The final translation was then submitted after the thorough check. As for differences among the groups, we observed that one group liked to discuss using the discussion zone (Group 2), while two of the groups liked using annotation (Groups 1 and 2). Group 2 also used the online messaging tool for communication, mostly for publishing messages and reporting task progress.

Question 2 of the interview was used to understand what students gained from participating in the cooperative translation activities. Group 1 members said that the activities increased their professional knowledge and vocabulary, as well as their competence in specialized English translation. They were no longer fearful of translating specialized English, and they felt that they had also become more interested in doing it. In addition, group leader M of Group 1 said that the activities increased his organizing competence. Student N said that he now had more confidence in his classmates and would actively seeking help from others when he had difficulties. Group 2 said that they were very united, and that their collaboration was very successful because it strengthened their understanding of professional knowledge and made them enjoy translating specialized English even more. It also enhanced their self-confidence. Student P of Group 2 also said that he liked to “pick a hole”, that is, he would patiently identify others’ mistakes and propose his own suggestions. Student Q of Group 2 said that he became more aware of the differences in expression between Chinese and English, and that the activities helped to increase his competence in organizing and expressing Chinese sentences. Members in Group 3 said that the task was a bit difficult for them, but that the team collaboration helped them to complete the task. The activities improved their interest and confidence in translation, but their improvement was not significant.

Question 3 was used to understand the students’ degree of satisfaction with the cooperative translation activities and their recommendations for future improvement. Students in Groups 1 and 2 were very satisfied with the activities and believed that specialized English courses should have more Web-based cooperative learning activities. Students in Group 3 were satisfied with the activities and believed that compared with traditional face-to-face instruction, collaboration was more effective in motivating students to do well. In addition, they also proposed many valuable recommendations, which can be summarized in the following four points: (1) more flexible grouping, or even free grouping, should be considered; (2) bonuses should be provided to motivate students; (3) the cooperative learning system should have an instant notice feature to let translators know when his or her text has been revised or commented on, etc.; and (4) the addition of more diversified translation materials, such as translations of English video lectures into Chinese, would be beneficial.

Discussion

The results of the above data analysis verified the two research questions proposed by the study. First, the online cooperative translation activities were found to improve student interest and self-efficacy. In addition, analysis of the cooperative translation activity data showed that student engagement was significantly correlated with interest and self-efficacy. Significant differences also were found in the post-test translation scores between the high- and low-engagement groups.

Effect of cooperative translation on interest and self-efficacy

The results of the pre-survey showed that the average scores of student interest and self-efficacy on specialized English translation were both lower than 3.0. The finding indicates that students lack interest in specialized English translation and do not have sufficient confidence in completing such translation tasks. This result is consistent with the status of SETI in China. One important reason is that instructors prefer traditional grammar-translation teaching models in which students are required to read and translate paragraph-by-paragraph, with grammar explanations provided repetitively. Compared with reading, translation is a more challenging learning task. Thus, most students fear specialized English translation (Zhu, 2006), resulting in a classroom lack of vitality and power.

The average scores of student interest and self-efficacy in the post-survey were 3.700 and 3.400, respectively. These results were significantly different (as shown in Table 1), indicating that Web-based cooperative translation could improve student interests and confidence significantly in translating specialized English. Although the self-efficacy score was not particularly high in the post-survey, the interview data showed that students no longer felt so fearful of the specialized English translation.

Many previous studies have also demonstrated the positive effects of both face-to-face and online cooperative learning approaches on student interest and self-efficacy towards learning (Francescato et al., 2006; Yusoff & Zin, 2011; Zheng et al., 2009; Zhou, 2011). According to the cooperative learning theory (Slavin, 2011), when students learn in groups, they can help each other to fix difficult problems and maintain passion in completing learning tasks. In this study, the cooperative learning system provided rich interaction means, like annotation, comment, discussion, etc. Through several rounds of social interaction, the relation networks between students were constantly reinforced, which may improve students' learning interest and self-efficacy further. In addition, under the joint efforts of group members, some challenging problems can be addressed. Moreover, the completion of challenging tasks would enhance student self-efficacy (Bandura, 1993).

In addition to interest and self-efficacy, it was also found that significant differences existed between the results of pre-test and post-test. After a contrastive analysis, we discovered that the average post-test scores increased significantly compared with the pre-test scores. In other words, through this cooperative translation task, the students made an obvious progress in learning performance. We reported this progress to two experienced teachers in SETI for Educational Technology. Both of them believed that the progress was difficult in such a short time contrast with their past teaching experiences.

Social constructivist theory (Mallory & New, 1994; Palincsar, 1998) holds that collaboration and conversation are required for constructing knowledge. This study covers both intra-group and inter-group collaboration for knowledge construction in a small group and wisdom sharing in a wider setting. Through three rounds of collaboration, students in this study could fully exchange their views, translation knowledge, techniques, and methods. In this way, they obtained a deeper understanding of the reading materials, and could obtain good performance in the translation task.

Correlation between engagement and interest, self-efficacy, and achievements

The cooperative translation activity totally generated 667 interaction records (including comments, annotations, posts, and content editing) by the 48 participants. It indicates that student engagement was generally high. In traditional classroom teaching of specialized

English, instructors often just choose a few students to answer questions, while collaboration among students is rare. Thus, Web-based cooperative translation can increase student engagement and motivate their active involvement in specialized English translation compared with traditional classroom teaching methods. Virtual learning environment may constitute a more relaxed and stress-free atmosphere than the traditional classroom, so language learners are more willing to express themselves and communicate with others (Roed, 2003).

The results of linear regression analysis (see Table 3) showed that student engagement was significantly and linearly related to interest and self-efficacy in the post-surveys. That means the higher of engagement level, the higher of levels of interest and self-efficacy, and vice versa. Students with higher levels of engagement could better integrate into the groups, thereby gaining more trust and encouragement. Accordingly, their levels of interest and self-efficacy would be increased. Moreover, active involvement is beneficial for improving team dynamics and team acquaintance, which are the core factors of learning efficiency in cooperative setting (Ku et al., 2013).

The results of the group interviews also demonstrated that engagement had a positive effect on interest and self-efficacy in specialized English translation. Students with high engagement clearly increased their interest and self-efficacy in addition to gaining many other benefits, including increased professional knowledge, better learning habits, and greater organizational capability. Students with medium engagement thought their interest and self-efficacy levels had been enhanced. Moreover, they acquired a great amount of professional knowledge. Students with low engagement noted that owing to their poor foundation in English, they faced many difficulties in translating articles containing many specialized vocabulary words. Their interest and self-efficacy were improved, but not as clearly as it had with the other two groups. Therefore, in future cooperative translation activities, instructors should pay more attention to these groups with low engagement, and provide more instant support and encouragement.

Although engagement was not significantly correlated with the post-test results, a significant difference was found between the high-engagement group and the low-engagement group. The average post-test score of the high-engagement group was 6.85 points higher than that of the low one. Thus, it can be believed that active engagement has a positive effect on the students' translation achievements.

Knowledge-building theory (Scardamalia & Bereiter, 2006) holds that learning is a social process for cooperative knowledge building. The cooperative knowledge building process covers sharing, argumentation, consultation, creation, and reflection (Xie, Song, & Liu, 2008). Students become epistemic agencies and masters of learning while engaging in cooperative activities (Looi, Chen, & Ng, 2010). In this study, each group progressed through the full cooperative knowledge-building process several times through the cooperative learning system. Specifically, two intra-group collaboration sessions and one inter-group collaboration session strongly motivated the students toward learning and helped them to complete the cooperative translation tasks successfully. The average score of the 12 completed translations was 51.125, indicating an overall satisfactory result of knowledge building in this translation activity.

Conclusion and implications

This study found the following two key results: (1) online cooperative translation can significantly improve student interest and self-efficacy with respect to specialized English translation and (2) in cooperative translation, student engagement is significantly and

linearly correlated with their levels of interest and self-efficacy. Some similar findings (Kargar et al., 2012; Zheng et al., 2009) have been reported by researchers in recent years, which also support the conclusions of this study. The main contribution of this paper is to verify the real effects of cooperative translation on Chinese college students' levels of interest and self-efficacy with respect to specialized English translation.

The results of this study will be helpful for improving current SETI in Chinese universities. Specifically, the suggestions for improvement implied by this study can be summarized as follows: (1) change the traditional SETI model of "grammar-translation" and carry out Web-based cooperative learning more actively and widely, including cooperative translation, cooperative writing, cooperative reading, etc.; (2) strike a good balance between translation skill drilling and the development of student interest and self-efficacy levels; and (3) improve student participation in cooperative translation through a variety of measures.

Although our current study successfully verified the positive effects of online translation on student levels of interest, self-efficacy, and competency, it also had some limitations. First, owing to not setting a control group or classroom, we could not compare our results with that of a similarly situated traditional SETI environment. Second, although we tried to keep the pre-test and post-test in the same difficulty level overall, the discriminations and difficulties of each test item were not considered fully, which may influence the quality and credibility of the tests. Third, because our experiment only lasted for a short period, we were not able to collect richer cooperative process data.

In our future work, we hope to conduct longer experiments on specialized English cooperative translation instruction with two parallel classes. One class is the experimental group and the other one as the control group. Then we can overcome the abovementioned limitations. The key elements of test including difficulty, discrimination, length, and test item types should be considered fully to enhance the reliability of the pre-test and post-test. In addition, more cooperative learning patterns and a greater variety of cooperative processes should be designed so that their different effects on competency, interest, attitude, motivation, and self-efficacy with respect to specialized English translation can be compared.

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Note

1. The web address is <http://www.sojump.com/>.

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