

Article

Implementing Project-Based Language Teaching to Develop EFL High School Students' Key Competences

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Abstract: This case study explored the impacts of project-based language teaching (PBLT) on developing high school students' key competences and the factors influencing the effect of PBLT on improving high school students' key competences in English as a foreign language. Two English teachers and 75 tenth graders from one middle school in Qingdao, China, were chosen as research participants. An explanatory mixed methods research design was adopted, including self-developed tests, semi-structured interviews, and teacher reflections. The results revealed that PBLT has many positive impacts on developing high school students' key competences in English as a foreign language, especially on six aspects, noticing and attentive (A-1) and extracting and summarizing (A-3) in the A level, describing and interpreting (B-1) and synthesizing and application (B-3) in the B level, and reasoning and arguing with evidence (C-1) and creating and imagining (C-2) in the C level. Meanwhile, five factors including teacher's understanding of PBLT, teacher's ability of designing and assessing the project, teacher's roles, teacher's instructions, and students' interest and motivation were found to influence the effect of PBLT on improving high school students' key competences in English as a foreign language. Moreover, the study provides important implications for language instructors on better understanding and effectively implementing PBLT in language teaching.

Keywords: project-based language teaching; high school students' key competences in English as a foreign language; Chinese case; impacts and factors



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1. Introduction

1.1. Research Background

At the end of 2017, the Ministry of Education of the People's Republic of China promulgated the English curriculum standards for senior middle schools and put forward training and developing students' core quality as the specific goal of English subject teaching in the senior high school English curriculum [1]. Along with the 21st century curriculum reform, much effort has been made to improve the quality of English education in China, but many classrooms are still found to be largely teacher-centred with little attention paid to students' language competence. Under such circumstances, a key project supported by the National Social Science Foundation (12th Five-Year Plan) was applied to improve students' key competences and teachers' teaching, which includes three phases, developing a disciplinary competence framework (DCF) (across nine subjects) with assessment tools, conducting large-scale assessment based on the DCF in collaboration with three local districts, and improving instructions based on students' diagnosed weak areas of learning in a collaborative manner. English, as the main discipline, is one part of this key project. Both English educators in universities and middle school English teachers were engaged in this project-based language teaching (PBLT) in order to improve high school students' key competences in English as a foreign language.

1.2. Project-Based Language Teaching

"Projects" are defined by questions or problems that are collaboratively investigated by students and teachers utilizing technology and resulting in a series of artifacts or prod-

ucts that address the questions or problems over time [2]. Under the guidance of constructivism [3], project-based teaching reintegrates the teaching contents of the traditional discipline system through the form of projects [4].

The goal of project-based teaching is to investigate real-world, standards-based problems that are of interest, relevance, value, and worth to students and teachers over a sustained period of time [5]. PBLT is an extended series of activities utilizing a combination of different language skills in pursuit of a goal or outcome [6,7]. This series of activities should be meaningful and bring about opportunities for comprehensible language input and output between interlocutors [8,9].

Stoller [10] put forward that PBLT should: (1) be oriented both towards the product and the process; (2) at least to a certain extent be defined by students; (3) be longer than one class period; (3) integrate all language skills; (4) integrate content and language learning; (5) involve group and individual work; (6) charge students with their own learning; (7) result in a product; and (8) allow for student reflection on the process and the product.

In a review of the research on project-based learning, Thomas [11] identified five distinguishing features of PBLT: (1) the use of projects that focus on content that is central to the curriculum; (2) projects are based on questions of importance or driving questions [12]; (3) projects involve students in ways that require them to identify problems, develop and design solutions, and create an end product such as a presentation, report, invention, or model; (4) projects are student-centered to the greatest extent possible. Teachers serve as resources, facilitators, and guides, but it is the students who define, choose and carry out their projects; (5) projects are developed from reality-based ideas and problems rather than on academic exercises and pursuits. The projects are complex tasks that involve students in designing, problem solving, decision making, and investigating in real-world dilemmas [11].

Both Thomas [11] and Kilpatrick [13] emphasize the depth of learning and intrinsic motivation as key benefits of PBLT, as well as a focus on student-centered, systematic inquiry [14].

1.3. Students' English Key Competences

The English Competence Framework was constructed based on Bloom's revised taxonomy [15] (see Figure 1).

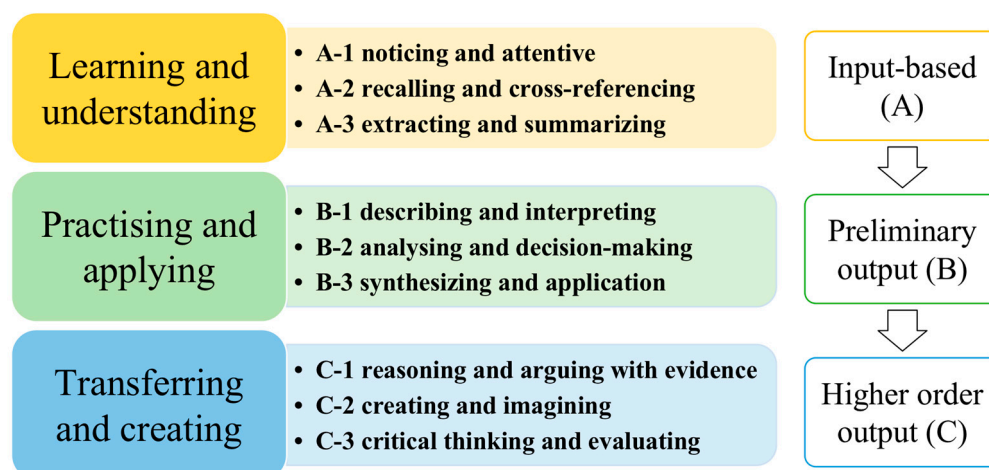


Figure 1. The English competence framework [16].

This framework is composed of three different English competence levels, which are learning and understanding for level A, practising and applying for level B, and transferring and creating for level C. Each English competence level also includes three competence sublevels, i.e., noticing and attentive (A-1), recalling and cross-referencing (A-2), extracting and summarizing (A-3), describing and interpreting (B-1), analysing and decision-making

(B-2), synthesizing and application (B-3), reasoning and arguing with evidence (C-1), creating and imagining (C-2), critical thinking and evaluating (C-3). Among them, competence level A belongs to input-based competence, competence level B belongs to preliminary output competence, and competence level C belongs to higher-order output competence.

1.4. Research Purpose

A significant body of research on the relationship between PBLT and student outcomes has accumulated since Thomas's [11] review. Studies in the past decade have shown that the use of PBLT is an effective means for widening educational opportunities, as well as helping students acquire a deeper knowledge through active exploration of real-world challenges and problems [17]. Many studies in both ESL (English as a second language) and EFL (English as a foreign language) contexts show that utilizing a PBLT can provide many benefits to classroom language learning. For example, many findings have indicated how PBLT provides meaningful contexts for authentic language use in much the same way as task-based language teaching [10,18,19], and a key distinction between the two is that projects are complex tasks [11]. Additionally, they show how PBLT is supportive of areas such as improving student motivation [20,21], student autonomy for learning [22], and creating opportunities for students' meaningful interactive language use [23]. "Teachers... [find] that project work [helps] [students] to focus intentionally not only on language skills but also on non-language skills within the affective and cognitive domains" [24] (p. 3).

Despite these identified benefits, few studies have explored the benefits of PBLT on students' English key competences, which is a newly proposed framework for students' sustainable development in English as a foreign language. Therefore, more studies are needed to explore projects that can be implemented with students in middle school EFL contexts and analyze the influence of PBLT on students' English key competences and the specific influential factors.

The present study addresses this gap in order to continue developing this line of inquiry. Two English teachers and 75 tenth graders were engaged in research-based project work in an English class at one middle school in Qingdao, China. Students' English key competences were tested, and both students' and teachers' interviews and teacher reflections were analyzed to explore the impact of PBLT on senior high school students' English key competences and the factors influencing the effect of PBLT on improving students' English key competences. It is hoped that the present study will provide inspiration and guidance on how to engage senior high school students in meaningful project work in the English class so that the development of students' English key competences can be facilitated.

2. Literature Review

2.1. Theoretical Bases for Projects in Language Teaching

The history of conducting "projects" can be traced to Dewey and other progressive educators and more recently to research performed by Polman [25] and Krajcik et al. [2]. The Dewey approach places the individual at the centre of the learning process [26,27]. In this way, individual learners become active agents in the learning process by continually encountering, exploring, and overcoming problems. Dewey [27] noted how through this exploration, knowledge is developed as a subjective interactive process between the individual and the world around. In this sense, the process is an experiential one. Rather than learning by rote, experiential learning theories suggest that learning is most beneficial when it is grounded in concrete experiences with the world around the individual [28,29]. Based on this, PBLT is supportive of learning by providing an authentic basis for learners to carry out learning-based problem solving through their second language in authentic ways [23].

2.2. The Impacts of Project-Based Language Teaching on Students' Language Learning

Previous studies have explored the impacts of PBLT on improving student motivation, autonomy, and other important skills within the language classroom. Egbert [21]

and Dörnyei and Ushioda [30] outlined that a balance of challenge and capability, clear goals to focus learners' attention, clear processes and outcomes that are both authentic and enjoyable, and a sense of student control over processes and outcomes are some key characteristics that influence motivation for class activities. Tessema [31] showed how utilizing PBLT assisted with engaging learners in the process of second language writing. Results on student motivation from the project were positive. Stoller [10] reviewed 16 previous studies utilizing PBLT and noted that the most commonly reported benefit is authenticity in language use and processes within projects. This authenticity and engagement from PBLT are also likely to be supportive of classroom motivation [32,33]. Lara et al. [34] found that students in the experimental group who were taught Spanish using the PBLT method performed significantly better on the oral comprehension and motivational variable, specifically on the subscale of the development of independent judgment.

PBLT can also assist with developing a more student-led classroom environment, student autonomy, and skills for lifelong learning [23,35–38]. Grant [23] explored the implementation and student perceptions of the project within an English for academic purposes writing course in Macau. The results indicated that the project appeared effective at creating opportunities for meaningful interactive language use, and students were comfortable with their autonomous role within the project. Findings also indicated that student motivation, autonomy, and learning opportunities were raised through the PBLT approach. Greenier [39] adopted the PBLT in the Korea EFL context, and the results indicated that middle school students enjoyed collaborating with and learning from their classmates and improved their communication and comprehension skills. Additionally, Wahbeh et al. [40] discovered that PBLT can improve students' personal and collaborative skills, and develop language students' mutual respect, confidence, and self-regulation of learning the Arabic language.

In addition, other necessary lifelong learning and transferable skills can be developed through a PBLT framework [41–43]. These skills include creativity and critical thinking and teamwork, as well as problem-solving skills [14,44–47] and students' core qualities [48]. Gao [49] put forward that PBLT can stimulate students' desire for knowledge and interest in English learning, cultivate students' ability to collect and process information, improve students' ability to use English in practice, and help students develop their English learning strategies and autonomous learning ability. In addition, Zheng et al. [50] mentioned that online project-based assignments were beneficial to high school students' English learning outcomes.

Based on the previous studies, we can see the important impacts of PBLT on students' language learning; however, these impacts are not focused on students' English key competences and are not systematically shown within one competence framework, and it is limited to deeply analyze the impacts of PBLT on students' language learning; therefore, the area still needs to be further explored.

2.3. Factors Influencing the Implementation of PBLT

Many conditions have been mentioned in order to create a successful PBLT experience, which can be seen as the important factors influencing the implementation of PBLT; for example, Kolber [51] listed the following features of effective L2 projects: (1) clear goals defined together with students at the initial stage of the project, (2) clear instructions including the theme, aims, and methods of work, (3) clear division of labor in groups, (4) products presented to a wider audience, (5) tapping on a number of modalities—aural, visual, and kinesthetic—while receiving and conveying information, and (6) reference to the situations familiar to students. In addition, Ertmer and Simons [52] argued that changing teachers' beliefs about their classroom role from that of director to facilitator is a key implementation hurdle for student-centered pedagogical approaches such as problem- and project-based learning. Beaudrie [53] examined the factors that can contribute to project-based learning in the context of teaching heritage language and suggested that the presence of Spanish

heritage language program leaders who bring expertise, commitment, dedication, and a mission to the program is a key factor in its success.

In summary, some factors that influence the implementation of PBLT have been explored. However, few studies have focused on those factors influencing PBLT on improving students' English key competences in the Chinese context. Therefore, more research needs to be performed in this field.

Based on the above literature, it is clear that PBLT has significant impacts on language learning and many factors influence its implementation. However, studies focused on the relationship between PBLT and students' English key competences are rarely seen. Thus, in order to fill this gap, this study explores the impacts of PBLT on developing high school students' key competences and the factors influencing the effect of PBLT on improving high school students' key competences in English as a foreign language.

3. Method

3.1. Research Questions

In order to explore the impact of PBLT on developing high school students' key competences and factors influencing PBLT on improving high school students' key competences in English as a foreign language, the following questions were raised:

- (1) What impact does project-based language teaching have on developing high school students' key competences in learning English as a foreign language?
- (2) What factors influence the project-based language teaching on improving high school students' key competences in learning English as a foreign language?

3.2. Research Participants

Two English teachers and 75 tenth graders at one middle school in Qingdao, China, were chosen based on purposeful sampling [54] since this middle school is one participant of the key project that is focused on PBLT. Because of this condition, these research participants met the requirements of the present study. In addition, pseudonyms are used to protect participants' identities.

Miss L is an experienced teacher with nine years of teaching experience. Miss W is a novice teacher with five years of teaching experience, and before the research, these two teachers reported in the interview that they were not familiar with PBLT and English key competences. Since both the teachers have taken part in the project of improving EFL high school students' English key competences by PBLT and both English teacher educators in the universities and middle school English teachers were engaged in PBLT, the two English teachers have received half a year of professional development. In the present study, they collaborated to design and take the lesson, with Miss L teaching the first 45 min and Miss W teaching the last 45 min.

This study included 75 students from two parallel intact classes with roughly the same level of English proficiency and they were also taught by the same English teacher. Despite being at an elementary level of English as grade ten students, they have a strong motivation in learning English and are interested in English. Class A (45 students) was chosen as the treatment group who received PBLT, while Class B (30 students) was chosen as the control group who were not exposed to this teaching method. According to the pre-test, there was no significant difference between the two groups in terms of three levels of English key competences.

3.3. The Case Project

The project in this study lasted for five months, including three phases: a collective lesson presentation, a trial teaching, and a formal teaching. Before the collective lesson presentation, all teachers in the project were given a lecture on how to conduct PBLT. In preparing for the teaching design, they mainly exchanged ideas with their colleagues. After each phase, experts from one key university in China gave suggestions on teachers' PBLT in promoting students' English key competency. Notably, one of the experts is also

the main researcher of this research, which facilitates providing insider views and ensuring the reliability.

PBLT in the present study follows Thomas' [11] five distinctive features. The case project was based on the reading material *A Lively City* from the 10th grade Foreign Language Teaching and Research Press textbook. The main goal of the class was to assist students with developing English key competences to facilitate introducing *A Lively City* in English. The final assessment was a speaking and writing assignment to give students an opportunity to explore and present their hometown, Qingdao, as a lively city and finish the brochure of introducing Qingdao, and PBLT was used in the class. The goals of PBLT were not to develop any single language skill or feature of their reading. Instead, the main aims of PBLT assignment were to develop students' English key competences in seeking out ongoing assistance and learning opportunities once the reading course was completed as well as provide authentic opportunities for meaningful language interactions to aid authentic communication in the real life.

The present case project was focused on the content of introducing a lively city in English, involving students to identify the question of how to introduce their hometown, Qingdao, as a lively city in English and create an end product in the form of presentation and the brochure of introducing Qingdao in groups. This case project was student-centered and developed from reality-based ideas and problems and it represented authentic efforts in solving or investigating real-world dilemmas [11].

3.4. Research Procedure

An explanatory mixed methods study [55] was designed for data generation, including two phases: firstly, a quantitative study using self-developed tests based on the English Competence Framework, and secondly, a qualitative study using students semi-structured focus group interviews, teachers semi-structured interviews, and teacher reflections triangulated the quantitative data and further explored the impact of PBLT on developing high school students' English key competences and factors influencing PBLT on improving high school students' English key competences.

The present study followed five steps. First, the researchers interviewed two English teachers and ten students in the treatment group. Second, the pre-test was made both in the treatment group and the control group. Third, PBLT was applied in the treatment group and students in the treatment group were able to use the class time exclusively for their projects, while the control group learned the same reading material without implementing PBLT. Fourth, the researchers interviewed ten students again in the treatment group. Fifth, the post-test was made both in the treatment group and the control group, two English teachers' teaching reflections were collected, and their interviews were conducted.

3.5. Data Collection

Based on the English Competence Framework aiming for improving students' English competences along with their cognitive and affective developments, the researchers developed a series of tests to assess students' English competences. Meanwhile, the researchers interviewed ten students and two English teachers. All the interviewed data were taped and transcribed. Two English teachers' teaching reflections as the main research materials were also collected.

3.5.1. Self-Developed Tests

To assess the development of students' English key competences, a pre-test and a post-test each consisting of 11 items were developed and evaluated under the scrutiny of a group of program members to ensure the validity. The group included two experts on testing and assessment, three experts on teaching methodology and teacher development, and ten undergraduates who majored in applied linguistics. These two tests were based on the English Competence Framework and included three levels of English key competences. The eleven items ranged from multiple-choice questions to short-answer questions

to writing (see Appendix A for items in self-developed tests). To note, A-3 level, B-1 level, B-3 level, and C-1 level occur twice in this test and their scores are added to a sum for data analysis and are discussed in the data analysis part.

To make the result consistent, the post-test is organized in a similar way so that the same items involve the same competence to be tested but differ in the content, such as the poem in the first item and the two reading texts. The Rasch analysis resulted in person reliability with 0.68 and item reliability with 0.96 in the pre-test, and the person reliability in the post-test was 0.89 and the item reliability was 0.97. Thus, it could be said the pre-test and the post-test are reliable in testing students' competences.

3.5.2. Interview

Two semi-structured interviews for students and teachers were developed under the experts' review. The interviews for students were conducted in a group of five in which interviewees were asked about the content of their English course before and after the PBLT was employed and their attitudes towards PBLT and teachers. Each interview lasted about half an hour. The five students were sampled purposively by the teachers based on their varied language proficiency levels.

The interviews for teachers mainly focused on their changes in teaching beliefs including their views on English subject and on teaching methodology, and their understandings of PBLT. Each interview lasted about an hour.

Before the formal semi-structured interviews, the interview outlines and the pilot studies were made ahead of time to ensure the validity. Both researchers revised the interview outlines based on the feedback of the pilot studies to better situate them in the EFL context before the formal interviews were made.

3.5.3. Teacher Reflections

Two English teachers wrote one teaching reflection, respectively, after the final teaching. They described the whole teaching process and reflected on their experience of PBLT.

3.6. Data Analysis

The data collected from pre-test and post-test were analyzed by the researchers anonymously through Rasch analysis in consideration of the multiple items involved [56] and the match between test items and English key competences. Compared with the Classical Test Theory (CTT), which is limited in the overreliance on the samples, Rasch analysis is preferred for its inferential nature of test takers' ability and for its universal applicability to various data types [57]. That is to say, in the CTT, test takers' scores could only show their performance on the specific item, while the Rasch model could generalize the performance on this test to the test takers' overall competence. As shown in the literature review and instruments, this study developed a test to investigate students' English key competences, which includes three aspects, each of which could be divided into three specific parts. Therefore, for this study, a multi-faceted Rasch measure is employed to test students' English key competences. Firstly, the raw data from the tests were collected and coded in an EXCEL file. As mentioned in the previous part, the scores of the items involving the same competence were added to a total. Then, the raw data after coding were analyzed through WINSTEP software to obtain the control file, which were further analyzed for statistics of items and persons. The control file was used to code the items and persons in the EXCEL file. Then, the control file was constructed to yield the person reliability and item reliability. At the same time, the Wright Map was constructed to show the distribution of the persons and the items. After that, due to the requirement of three levels of competence, the control file was coded further and analyzed in the ConQuest software to obtain the overall results of the three levels in two groups. Each of the nine competences were, respectively, calculated through the division of observed scores on the total scores. These tests' scores were analyzed based on the Rasch model so that the impact of PBLT on EFL high school students' English key competences could be seen. Furthermore,

the effect sizes were calculated to investigate the magnitude of the impact of PBLT on improving students' English key competences. Cohen's *d* is the most widely used effect size by comparing two groups' means, which could show the actual experimental effect [58]. Generally, effect sizes are small at around 0.2, moderate at 0.5, and large at 0.8 according to Cohen [58]. In the field of education, Hattie [59] found the effect sizes from 0.4 to 0.7 as moderate and the effect size over 0.7 was considered desired effect for educational interventions based on the synthesis of meta-analyses in education. Therefore, Hattie's [59] standard was adopted to analyze the effect size.

The transcribed interviewed data and two teachers' teaching reflections were analyzed based on Moustakas' [60] data analysis procedure, Creswell's [61] three steps in the data analysis, and Bogdon and Biklen's [62] data analysis methods by the main researchers of this research. All text data were coded and categorized to form different themes according to the research purpose so that both the impact of PBLT on developing EFL high school students' English key competences and those factors influencing the effect of PBLT on the improvement in EFL high school students' English key competences could be explored. In order to guarantee the reliability and validity of this research, three strategies were adopted. Firstly, this research adopted abundant data resources and collection methods to ensure the richness of data for triangulation validation. Specifically, this research employed data source triangulation by adopting tests, interviews, and teachers' reflective logs, which enabled the data to be cross-referenced for richness, reliability, and inherent consistency. Secondly, the researchers kept research logs in the whole research process to guarantee the validity of the study. Researchers conducted continuous reflection by recording personal opinions, confusions, as well as epiphanies in the research logs, which also served as a reminder and inspiration for the researchers. Last but not least, this research also asked for feedback from research participants to guarantee the validity of the descriptions and analysis. Throughout the process of data analysis, the researcher actively interacted with the participants about the understanding of their expressions, and participants were also asked to read through the data and analyses to ensure the validity.

4. Results

Based on the analysis, six significantly improved students' key competences and five main influencing factors were identified (see Table 1).

Table 1. Major findings of the impacts and factors influencing project-based language teaching (PBLT).

Major Findings		
Impacts of PBLT	Quantitative data (self-developed tests)	<ul style="list-style-type: none"> • Noticing and attentive (A-1) • Extracting and summarizing (A-3) • Reasoning and arguing with evidence (C-1)
	Qualitative data (semi-structured interviews)	<ul style="list-style-type: none"> • Describing and interpreting (B-1) • Synthesizing and application (B-3) • Reasoning and arguing with evidence (C-1) • Creating and imagining (C-2)
Factors Influencing PBLT	Qualitative data (semi-structured interviews and teacher reflections)	<ul style="list-style-type: none"> • Teacher's understanding of PBLT • Teacher's ability of designing and assessing the project • Teacher's roles • Teacher's instructions • Students' interest and motivation

In this section, the findings are presented, respectively, from quantitative to qualitative data to address the two questions.

4.1. Impacts of PBLT on Developing EFL High School Students' English Key Competences

This part is concerned with the results from the Rasch analysis, the interviews, and the teacher reflections.

The Wright Map of the pre-test and post-test through the WINSTEP software shows the summary of the two main items and persons as shown in Figure 2. On the far-left side is the Rasch logit scale in which the pre-test ranges from -4 to 4 and the post-test ranges from -4 to 6. Persons are indicated by "X". More able test takers are toward the top of the figure and less able test takers are toward the bottom. The items are labeled by their underlying competences from A1 to C3 as referred to in Figure 1. More difficult items are toward the top of the figure and the easier items are toward the bottom figure. Although there exists some inconsistency between items and persons, such as some outliers, most items are sufficient to measure the test takers' key competences. In the pre-test, the B1 level was much more difficult for test takers, and this was the same in the post-test.

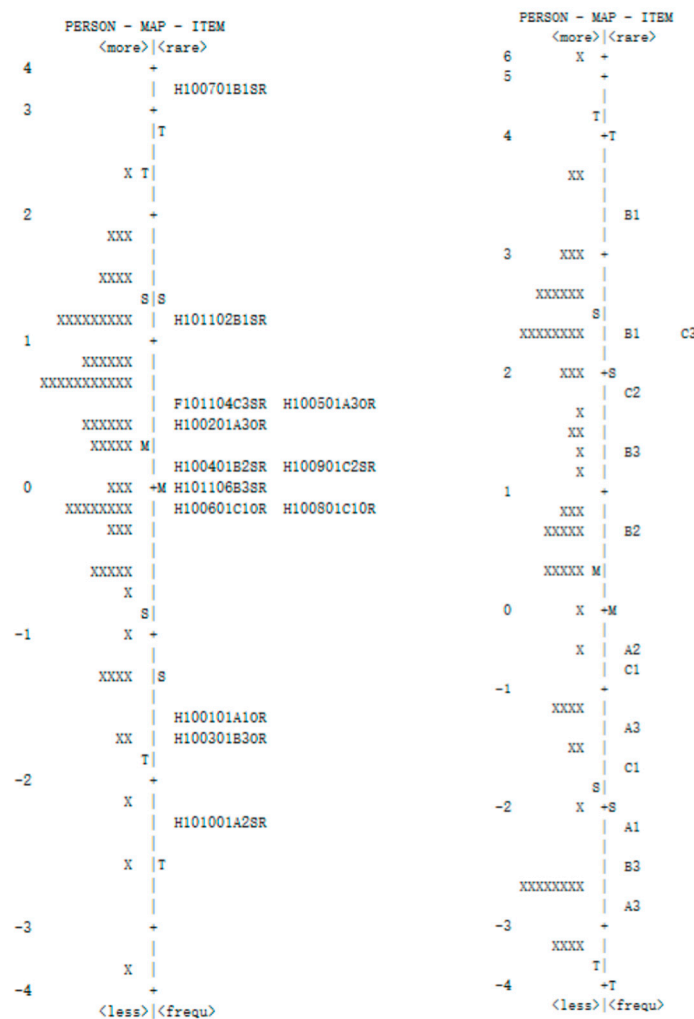


Figure 2. The Wright Map of pre-test (left) and post-test (right). Note: "X" represents one person; M = means; S = 1 SD; T = 2 SD; A1–C3 means the key competences to be tested.

Except for the Wright Map, the summary of the person statistics and item statistics is shown in the Table 2. The mean person ability for the pre-test is measured at 0.27, while this is 0.51 for the post-test. As for the model fit statistics, the mean infit mean-square is 0.9 for the pre-test and 0.85 for the post-test, which are both under the appropriate range [57]. The appropriate infit tells the homogenous level of the test takers. The separation measure for person in the pre-test is 1.46 and the reliability is 0.68, neither of which reach the

expected range, which means the test takers' ability is almost the same in the two groups and cannot be separated. However, the separation measure for person in post-test is 2.91, which indicates there are about three different levels between the test takers, and the reliability for separation is 0.89, which means there is about 90% percent reliability for the true separation. The mean item measure for both the pre-test and post-test is zero, which indicates the difficulty level is consistent with the test takers' ability. The fit statistics shows an appropriate fit with 1.0 for the pre-test and 0.95 for the post-test, which means there is a good fit between the test takers' ability and the item difficulty level. The separation measure is 4.63 for the pre-test and 5.26 for the post-test, and the reliability for each measure is 0.96 and 0.97, respectively. These data reveal that the items can distinguish different levels of difficulty.

Table 2. The summary of person statistics and item statistics for pre-test and post-test.

	Measure	Error	Infit Mnsq	Separation	Reliability	
pre-test—person	0.27	0.52	0.90	−0.20	1.46	0.68
pre-test—item	0.00	0.26	1.00	0.00	4.63	0.96
post-test—person	0.51	0.70	0.85	−0.10	2.91	0.89
post-test—item	0.00	0.35	0.95	−0.20	5.26	0.97

Note: Mnsq = mean-square.

Then, the Rasch analysis reveals the greater improvement in students' English key competences, and the results from the pre-test and post-test are shown in Table 3. From Table 3, we can see the English key competences of learning and understanding for level A significantly improved.

Table 3. The competences from pre-test and post-test.

	Group	Total	A Level	B Level	C Level
Pre-test	Total	0.27	0.77	−0.22	0.19
	Treatment	0.51	0.84	0.02	0.34
	Control	−0.01	0.68	−0.49	0.01
Post-test	Total	0.60	2.11	−0.43	0.13
	Treatment	1.65	3.26	0.49	1.19
	Control	−0.84	0.52	−1.7	−1.35

The nine competences of the two groups are displayed in Table 4. From Table 4, we can see the nine English key competences of the treatment group are all higher than those of the control group in the post-test, so this can prove the impact of PBLT on the development of EFL high school students' English key competences. Moreover, the scores are presented as percentages because the scores corresponding to each key competence in the two tests are not the same (see the Section 3.5.1.) Among the nine English key competences of the treatment group in the post-test, noticing and attentive (A-1) in the A level, extracting and summarizing (A-3) in the A level, and reasoning and arguing with evidence (C-1) in the C level had the most significant improvements among all of the levels. Notably, the scores of the control group declined significantly in the post-test, mainly due to the teacher in the control group not teaching based on the key competences.

Table 4. The percentage of nine competences scores.

	Pre-Test		Post-Test	
	Treatment	Control	Treatment	Control
A-1	82.5%	77.1%	97.2%	57.7%
A-2	100%	90%	91.7%	38.5%
A-3	43.75%	48.57%	94.4%	57.7%
B-1	35.83%	19.52%	33.8%	9.6%
B-2	65%	40%	63.9%	30.8%
B-3	75.83%	50.83%	72.2%	32.0%
C-1	63.75%	55.71%	94.4%	40.4%
C-2	52.5%	45%	48.6%	30.8%
C-3	50.63%	45.71%	50%	12.5%

The difference in the effect sizes (Cohen's d) are presented in Table 5. According to Hattie [59], the effect size in the pre-test ($d = 0.56$) is moderate, and the effect size in the post-test ($d = 1.64$) is significant, which demonstrates the efficacy of PBLT on the development of students' English key competences.

Table 5. The effect size of implementing PBLT for English key competences.

	Pre-Test		Post-Test	
	Treatment	Control	Treatment	Control
Mean	13.02	10.71	14.39	5.96
SD	3.31	4.75	4.73	5.48
Cohen's d		0.56		1.64

Note: SD = standard deviation.

From analyzing the interview data with students, we can see the specific impacts of PBLT on the development of EFL high school students' English key competences, especially the marked influence on students' English key competences of describing and interpreting (B-1), synthesizing and application (B-3), reasoning and arguing with evidence (C-1), and creating and imagining (C-2). The teachers mentioned more about the students' improvement in the B and C levels (B-1, B-3, C-1, C-2), which was mostly because of the students' impressive performance displayed in carrying out the project, as opposed to the quantitative results (A-1, A-3, C-1).

Here are some excerpts from student interviews to show the significant improvement in four aspects.

Excerpt 1. When we are making the brochure in the group, this kind of discussion is very useful. Sometimes, my classmate may share their different ideas with me and I think their opinions are very reasonable. (S1-Interview-02)

Excerpt 2. Our activities are project-based and we can have a discussion together and make the presentation together, and I think this is what learning should be like. (S5-Interview-02)

From the above interviews, we can see PBLT influenced students' English key competence of describing and interpreting (B-1). PBLT provided more opportunities for students to cooperate with each other, have a discussion together, and share different ideas, so that they had more chances to describe and interpret their ideas.

Excerpt 3. I think through taking part in the project-based language learning activities, we can blend what we have learned into the project presentation. (S8-Interview-02)

PBLT can enhance students' English key competence of synthesizing and application (B-3) since students can blend what they have learned into the project presentation in order to finish the project.

Excerpt 4. If I can't understand what my teacher or my classmates said during taking part in the project, I will try to guess the meaning based on the context. This is the big achievement I have got from this teaching way. (S10-Interview-02)

PBLT can also improve students' English key competence of reasoning and arguing with evidence (C-1) since students can try to guess the meaning based on the context during taking part in the project.

Excerpt 5. During making the project, we can have a discussion together and brainstorm many good and new ideas and I like this way very much. (S2-Interview-02)

PBLT developed students' English key competence of creating and imagining (C-2) since students have more opportunities to create new ideas through the discussion.

To sum up, the above excerpts from students demonstrate the positive impacts of PBLT on developing EFL high school students' English key competences, especially in four aspects (B-1, B-3, C-1, C-2).

4.2. Factors Influencing the effect of PBLT on Improving EFL High School Students' English Key Competences

The qualitative data were analyzed without presupposing any point of view based on the specific framework of factors influencing PBLT. Through analyzing the interview data and teacher's reflections data, we can see that teacher's understanding of PBLT, teacher's ability of designing and assessing the project, teacher's roles, teacher's instructions, and students' interest and motivation are the main factors that influence the effect of PBLT on improving EFL high school students' English key competences. Following are excerpts from the two teachers' interviews and reflective logs to illustrate the five main influencing factors.

Excerpt 6. I am clearer on the importance of making the instruction design based on PBLT. (L-Interview)

Excerpt 7. I have learned that PBLT is to help students construct the new knowledge based on the prior knowledge so that they can use the knowledge in their real life. (L-Reflection)

From the above data, we can see Miss L has a clear understanding of PBLT and this is the premise of the successful application of PBLT in the present study.

Excerpt 8. In PBLT, we need to design a project which is closely related to the main theme of the reading material, meanwhile, we need to give a real context to students and ask students to solve the real problem. (L-Interview)

Excerpt 9. We should design the project based on students' prior knowledge and I think this is also very important. (L-Reflection)

Excerpt 10. Each step of the project should be very clear and closely related to each other and those steps of the project should be hierarchical. (L-Reflection)

Excerpt 11. How to make the project assessment is an important factor that may influence the effect of PBLT. (W-Interview)

Excerpt 12. How to give effective feedback to students' performance after finishing the project is very important. (W-Reflection)

Excerpt 13. Making good assessment sheet and guiding students to assess their classmates' performance are very important to help students improve their assessing abilities in PBLT. (W-Reflection)

Having the ability of designing and assessing the project is one of the most important factors that can influence the effect of the implementation of PBLT on improving EFL high school students' English key competences. From the above data, we can see the two teachers noticed the importance of designing and assessing the project and formed their own understandings on PBLT, such as "design a project which is closely related to the

main theme of the reading material”, “give a real context to students and ask students to solve the real problem”, “design the project based on students’ prior knowledge”, “each step of the project should be very clear and closely related to each other”, “those steps of the project should be hierarchical”, “how to give the effective feedback to students’ performance after finishing the project is very important”, “making the good assessment sheet and guiding students to assess their classmates’ performance are very important”, etc.

Excerpt 14. We need to trust our students and give more opportunities to students. More discussions can provide students the opportunities to practise their oral English. (L-Interview)

Excerpt 15. Don’t underestimate students’ abilities and we should give students more opportunities. If students were given more chances, they would feel very excited and can also actively take part in the project. (W-Interview)

Excerpt 16. Teachers should play the role of being facilitators and I think this is also a very important point in applying PBLT. (W-Interview)

Excerpt 17. As a teacher, we should trust our students and guide students’ learning effectively. I think this point is also very important. (W-Reflection)

What kind of role the teacher plays in applying the project is also an important factor that can influence the effect of the implementation of PBLT on improving EFL high school students’ English key competences. From the above data, we can see both teachers noticed the importance of trusting students and providing more opportunities to make students take part in the project. Miss W also mentioned the teacher should be the facilitator to guide students’ learning effectively. Just because of the teacher facilitator’s role, students are given more chances to have a discussion and cooperate in PBLT, and their English key competences can be significantly improved.

Excerpt 18. Clear teacher instructions are very important. If we cannot give students clear teacher instructions in each part of the project, students would feel very confused and the project cannot be finished effectively. (W-Interview)

Excerpt 19. Teacher instructions should be meaningful. Meaningless teacher instructions can influence the application effect of the project. (L-Reflection)

Clear and meaningful teacher instructions can guarantee the successful application of the project; therefore, it is also one factor that may influence EFL high school students’ English key competences during the implementation of PBLT.

Excerpt 20. The project should interest students and make students have the strong motivation to take part in the project, for example, in making the brochure and introducing Qingdao, students are motivated by making the contribution to their hometown. (L-Interview)

Students are in charge of finishing their own project, so their interest and motivation should also be important factors influencing the effect of the implementation of PBLT on improving EFL high school students’ English key competences.

Overall, the above excerpts from teachers reflect the five main factors influencing the effect of PBLT on improving EFL high school students’ English key competences from the perspective of both teachers and students.

5. Discussion

5.1. Impacts of PBLT on Developing EFL High School Students’ English Key Competences

Many impacts of PBLT have been found that help to develop EFL high school students’ English key competences, especially on noticing and attentive (A-1) and extracting and summarizing (A-3) in the A level, describing and interpreting (B-1) and synthesizing and application (B-3) in the B level, and reasoning and arguing with evidence (C-1) and creating and imagining (C-2) in the C level based on the quantitative (self-developed tests) and qualitative data (semi-structured interviews). For example, students mentioned that

they enjoyed learning in groups, could better blend their knowledge into use, and actively engaged in discussion, which mainly demonstrated their improvement in the A and B levels. Meanwhile, they sought out every source to facilitate their learning, which proved the benefit of PBLT on students' creativity and critical thinking [14,44–46,63] and students' core qualities [48,64] in the C level. Moreover, this study provided more evidence on the impacts of PBLT on students' English key competences by providing the effect size. After one semester's intervention, the Cohen's *d* effect size of the two groups in the post-test was 1.64, which is considered a rather large one [59]. We can see that students in the treatment group made far more improvement on the English key competences compared with the control group. Thus, it can be concluded that PBLT has a significant impact on improving students' English key competences.

Similar to other studies, which found a beneficial effect of PBLT on students' sustainable development, such as sustained engagement in Aubrey's study [65], sustained motivation in Park and Hiver's study [66], and sustainable life habits in Wahbeh et al.'s study [40], the present study found the impacts of PBLT to be on students' sustainable development in learning interest, sense of achievement, and learning opportunities. This finding echoes the effects of PBLT on students' motivation, autonomy, and learning opportunities [10,22,23,31,34–38,67,68] and supports the belief that students experience a more interesting and meaningful learning process in a PBL English class and they can also become highly motivated to use English more intensively when exposed to this teaching approach [69], and the level of student engagement was immense throughout the project unit [70,71].

5.2. Factors Influencing the Effect of PBLT on Improving EFL High School Students' English Key Competences

The present study echoed other research findings that showed that teacher- and student-related factors influence the effects of PBLT on the students' development in English key competences. Two teachers in the present study received a certain amount of teaching experience and half a year of professional development experiences on PBLT. Pre-service and in-service professional development experiences influence the degree to which teachers implement project-based approaches in their science teaching [5]. In the present study, the researchers also found that the factor of teachers' understanding of PBLT was important to successfully apply PBLT and this result is consistent with Toolin's [5] opinion.

In designing the project, teachers in the present study noticed that giving a real context to students and asking students to solve a real problem are very important, and this echoes the result that the realism presented through an authentic language context, whether online or face-to-face, may be beneficial for conducting PBLT in Asian contexts [23].

In the present study, the researchers found a teacher's role to be that of a facilitator who plays an important role in implementing PBLT, which echoes the opinion of Ertmer and Simons [52] and Al-Busaidi and Al-Seyabi [67]. Meanwhile, teachers in the present study mentioned the importance of clear instructions in implementing PBLT, which is consistent with Kolber's opinion [51].

Students' interest and motivation has been found to be the main factor influencing the effect of the implementation of PBLT on improving EFL high school students' English key competences, and this result strongly highlights the student's agent role in PBLT [70–73].

6. Conclusions

The current study investigated the impact of PBLT on developing senior high school students' English key competences and the factors influencing the effect of PBLT on improving students' English key competences. An explanatory mixed methods research design was adopted, including two tests based on the English Competence Framework completed by 75 participants, group interviews involving ten Grade 10 students and two English teachers, and two teacher reflections. Based on the data analysis, the findings revealed that PBLT has many positive impacts on developing EFL high school students'

English key competences, especially on six aspects, namely, noticing and attentive (A-1) and extracting and summarizing (A-3) in the A level, describing and interpreting (B-1) and synthesizing and application (B-3) in the B level, and reasoning and arguing with evidence (C-1) and creating and imagining (C-2) in the C level. Meanwhile, five main factors are identified as influencing the effect of the implementation of PBLT on improving EFL high school students' English key competences, which are the teacher's understanding of PBLT, teacher's ability of designing and assessing the project, teacher's roles, teacher's instructions, and students' interest and motivation. The present research provides implications for worldwide language instructors to effectively adopt PBLT in language teaching and enriches the research in promoting students' English key competences through PBLT, especially in the EFL context.

7. Limitations and Implications

This study demonstrated many positive impacts of PBLT on developing EFL high school students' English key competences and five main factors influencing the effect of the implementation of PBLT on improving students' English key competences by tests, interviews, and teacher reflections. Some important limitations of this study should be considered. First of all, the small sample size and lack of longitudinal test measures on more projects may limit the ability for the study to explore more deeply the impacts of PBLT on developing EFL high school students' English key competences. In addition, the lack of questionnaire data for analyzing the impacts of PBLT and the factors influencing the effect of PBLT on improving students' English key competences may limit the richness of the research results. Future research would be useful to explore the impacts of PBLT and the factors influencing the effect of PBLT on improving students' English key competences for the Chinese context in a more systematic and reliable manner.

The present study leads to a number of implications for EFL language instructors: (1) Designing a project which is close to a student's real life is beneficial since only when the project is close to reality can it have value [74]. (2) The project's theme should be closely related to the main theme of the reading material so that students have more chances to transfer what they have learned to their real life. (3) Providing clear and logical instructions for students was significantly correlated with achievement on the project. Clear instructions no doubt empower students to acquire the understanding and confidence in projects, as they are able to identify essential components and follow crucial processes [75]. (4) Language teachers should play the role of facilitator and supply appropriate scaffolding to students since scaffolding can help analyze complex information and offer a framework for expected components of an effective collaborative project [76,77]. (5) Language teachers should empower students to actively take part in the project and make full use of their agency.

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Appendix A

Items in self-developed tests

Appendix A.1. Items in the Pre-Test

- 1 [A1] Read the poem written by William Wordsworth. Pay attention to the pronunciation of the last word in each line. What is the rhyme scheme (韵脚规律) of these lines? (multiple-choice question) Passage A (2–4)
- 2 [A3] What is the passage mainly about? (multiple-choice question)
- 3 [B3] Which is the correct order according to the whole passage? (multiple-choice question)
- 4 [B2] From the underlined sentence in para. 4, we can infer that Mike may feel _____ at that time. (Fill in the blank with a proper adjective 形容词) Passage B (5–9)
- 5 [A3] According to paragraph 1, what leads her to a new inspiration? (multiple-choice question)
- 6 [C1] The underlined word dissent in paragraph 1 probably means _____. (multiple-choice question)
- 7 [B1] Explain in your own words what the author means by “The top of the coat would hit one wall, and the bottom would be out the door”. (short-answer questions)
- 8 [C1] According to the passage, what is the aim of Veronika’s efforts? (multiple-choice question)
- 9 [C2] Veronika Scott is one of the innovators to help the homeless. What other ways can you think of to help the homeless? (short-answer questions)
- 10 [A2] When you see the name “My New Teachers”, what English nouns or adjectives (名词或形容词) that are relevant to it come to your mind? Write them in the circles below. (short-answer questions) Writing Task
- 11 [B1, C3, B3] Recently, a survey was done on people’s attitudes towards e-books and traditional books. Do you believe e-books will replace paper books? Please first introduce the survey results, voice your opinion and then explain why. (No less than 100 words)

Appendix A.2. Items in the Post-Test

- 1 [A1] Read the poem written by Percy Bysshe Shelley. Pay attention to the pronunciation of the last word in each line. What is the rhyme scheme (韵脚规律) of these lines? (multiple-choice question) Passage A (2–4)
- 2 [A3] What’s the story mainly about? (multiple-choice question)
- 3 [B3] What’s the correct order according to the passage? (multiple-choice question)
- 4 [B2] In your opinion, the behavior of the writer and Kavya’s entering into the Takku’s house is _____. (Fill in the blank with an adjective 形容词) Passage B (5–9)
- 5 [A3] According to paragraph 2, what is required for a marriage? (multiple-choice question)
- 6 [C1] The underlined word consent in paragraph 2 probably means _____. (multiple-choice question)
- 7 [B1] Explain in your own words what the author means by using the sentence “many people do not always follow tradition so closely” in paragraph 4. (short-answer questions)
- 8 [C1] What is the aim of the author? (multiple-choice question)
- 9 [C2] As is mentioned in the passage, the weddings in Britain has changed through time. How would you like to plan your own wedding(s)? How traditional would it be? What parts would it consist of? and why? (short-answer questions)
- 10 [A2] When you see the name “IT”, what English nouns or adjectives (名词或形容词) that are relevant to it come to your mind? Write them in the circles below. Writing Task
- 11 [B1, C3, B3] Recently, a survey was done on books in a kid’s library. Which kind of books do you think should take the most space in a kid’s library? Please first in-

roduce the survey results, voice your opinion and then explain why. (No less than 100 words)

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